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Smith, Michael Ernest

POSTCLASSIC CULTURE CHANGE IN WESTERN MORELOS, MEXICO: THE DEVELOPMENT AND CORRELATION OF ARCHAEOLOGICAL AND ETHNOHISTORICAL CHRONOLOGIES

University of Illinois at Urbana-Champaign PH.D. 1983

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POSTCLASSIC CULTURE CHANGE IN WESTERN MORELOS, MEXICO: THE DEVELOPMENT AND CORRELATION OF ARCHAEOLOGICAL AND ETHNOHISTORICAL CHRONOLOGIES

BY

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A.B., Brandeis University, 1975
A.M., University of Illinois, 1979

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Anthropology
in the Graduate College of the
University of Illinois at Urbana-Champaign, 1983

Urbana, Illinois

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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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THE DEGREE OF Doctor of Philosophy

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POSTCLASSIC CULTURE CHANGE IN WESTERN MORELOS, MEXICO: THE DEVELOPMENT AND CORRELATION OF ARCHAEOLOGICAL AND ETHNOHISTORICAL CHRONOLOGIES

Michael Ernest Smith, Ph.D.
Department of Anthropology
University of Illinois at Urbana-Champaign, 1983
(Advisor: Dr. David C. Grove)

The present work is a case study in archaeological chronology, showing how certain methods--nontypological ceramic analysis, quantitative seriation, and historical correlation--can advance our understanding of processes of political and economic evolution in an agrarian state society. The study is set in the central Mexican highlands during the Postclassic epoch, where the nature of cultural dynamics has been obscured by a lack of attention to chronology building and the resulting imprecision of existing archaeological sequences. The specific area analyzed is the western portion of the Mexican State of Morelos, a region where Postclassic archaeology has been particularly neglected.

A comparative analysis of central Mexican historical accounts in conjunction with linguistic reconstruction leads in Chapter 2 to the conclusion that Nāhuatl-speaking immigrant populations arrived and settled central Mexico, including Morelos, early in the thirteenth century A.D. The later fate of the Nāhuatl group that populated western Morelos--the Tlahuica--is chronicled in Chapter 3, which documents the political evolution of the Cuauhnāhuac polity and its changing interactions with surrounding states.

Most of the archaeological ceramics analyzed and described in the thesis were excavated at the site of Xochicalco by the Xochicalco Mapping Project in 1977. The Postclassic excavations are described in Chapter 4, along with a discussion of the approach to ceramic analysis utilized.

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Chapter 5 presents a nontypological quantitative seriation of the Xochicalco ceramics using multidimensional scaling. The resulting 5-phase sequence, tested through its extension to the nearby site of Coatetelco, currently stands as the most refined archaeological chronology of the Postclassic epoch in central Mexico. The phases are treated as ceramic complexes in Chapter 6, and the ceramics of each complex are described in terms of a synchronic cultural/functional classification.

The final chapter summarizes the major cultural implications of the native historical and archaeological chronologies taken separately, then juxtaposes the two and evaluates the extent of their compatability; the separate yet parallel nature of the two sequences is emphasized. Two of the most significant areas of correlation are: (1) the arrival of the historical Tlahuica in Morelos is associated with the inception of a distinctive polychrome ceramic style; and, (2) the Triple Alliance conquest of Western Morelos in 1438 is correlated with ceramic changes indicating an impoverishment of the material culture inventory at Xochicalco. This finding represents the first time that the archaeological impact of Triple Alliance expansion into a provincial area has been isolated; previous attempts have failed because of the gross temporal constructs utilized. The present work demonstrates the kinds of results obtainable when the appropriate methods are applied to archaeological data from complex state-level societies.

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CHAPTER 1

INTRODUCTION

The central Mexican plateau during the Postclassic epoch was the setting for the rise and fall of a number of centralized states and empires. Archaeological excavation has been carried out in much of this region, and surface reconnaissance has covered a greater proportion of the total land area than in any other area of comparable size in the New World. The various political and economic processes associated with the cycles of Postclassic states are documented not only in the archaeological record, but in native historical sources as well. Central Mexico was one of the few areas in the New World to develop an indigenous tradition of written and oral history, and the events portrayed in these accounts cover most, if not all, of the Postclassic epoch (ca. A.D. 950-1519). Given the nature of cultural evolution in Postclassic central Mexico and the richness of the data available for study, this area should be at the forefront of the development and testing of models of political and economic change in agrarian state societies. This is not the case, however, because the available chronological framework for central Mexico is completely inadequate to the tasks of documenting and explaining the changes of the Postclassic epoch.

There are two primary reasons for the inadequacy of the central Mexican Postclassic chronologies. First, those archaeologists working on the Postclassic period have shown little interest in basic chronology

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building; and second, there are some special methodological problems of this time period involving archaeology, native history, and their correlation which have stymied chronological advancement. The lack of interest in temporal refinement in this region is related to the emphasis upon surface data and a corresponding neglect of excavation data for Postclassic central Mexico. The large scale surface reconnaissance projects of Sanders, Parsons and others over the past two decades have provided a wealth of information on changing Prehispanic settlement patterns (see Sanders, Parsons and Santley 1979). This surface work was accompanied by related but separate excavation projects which directed attention to chronological problems for both the Formative (e.g. Tolstoy and Paradis 1970; Tolstoy et al. 1977) and the Classic periods (e.g. Millon 1973; Rattray 1977). However, for the Postclassic period, archaeologists have tended to accept without question the received chronologies, only to pursue further surface archaeology (e.g. Lewarch and Mason 1977; Alden 1979; Brumfiel 1980; Mason 1980). With the exceptions of Parsons (1966) and Cobean (1978), there has been virtually no effort directed at refining Postclassic temporal sequences in central Mexico. It can easily be shown that the crude chronologies used by recent surface studies prevent the solution of the specific research problems addressed.

This chronological barrier to understanding is best illustrated by developments of the Late Postclassic period. The formation of the Triple Alliance of Tenochtitlan, Texcoco and Tlacopan in 1428 marks a major turning point in the political and economic history of Prehispanic central Mexico. Imperial expansion outside of the Basin of Mexico began at this time, and the economic and political system described by the

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Spanish in 1519 had its inception at approximately this date. The rise of the Triple Alliance (or "Aztec") empire and its effects both locally and in distant conquered areas have been and will continue to be among the primary research concerns of the Postclassic period in central Mexico. Archaeologists have accordingly begun to interpret late Prehispanic material remains on the basis of early Spanish descriptions of native culture, which pertain to the period between 1428 and 1519. However, the temporal construct used in such archaeological studies--the Late Postclassic period (or Late Aztec period or Late Horizon; see below) --is presentedly dated at ca. 1350-1520; it thus includes nearly equal intervals of time prior to and after the formation of the Triple Alliance. There is currently no way to determine whether a given "Late Postclassic" archaeological assemblage pertains to the heavily documented period after 1428, to the relatively poorly known (from written sources) period prior to 1428, or to a combination of both intervals. Because the questions of interest involve a comparison of pre-1428 conditions with those of the later period, the archaeological data from such an inclusive period are obviously of little help. Until the Late Postclassic period can be subdivided into at least two temporal phases in the regions under study, attempted reconstructions of political and economic development in the Basin of Mexico (e.g. Brumfiel 1980) or the impact of the Triple Alliance economy outside of the Basin of Mexico (e.g. Mason 1980) will be of very limited value.

The intent of the present work is to address the problem of chronology building in Postclassic central Mexico in order to obtain the

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kind of results necessary to advance our understanding of processual change in this area. Specifically, it is demonstrated below that, (1) native historical accounts, in spite of several obvious sources of bias, are important sources of chronological information and can be used to reconstruct events that occurred over three centuries prior to the Spanish conquest; (2) archaeological chronologies in Postclassic central Mexico can be refined to the order of 100-year phases when the appropriate methods --in this case, nontypological ceramic analysis and quantitative seriation --are applied to excavation data; and (3) in spite of past failures, archaeological and historical chronologies can be accurately and productively correlated in order to advance our understanding of the dynamics of culture change in Postclassic central Mexico.

The usefulness of central Mexican native historical accounts for chronological analysis has been the subject of some debate. These accounts, which combine oral narrative with pictorial representations (see Calnek 1978), are known to us through early Colonial copies of Prehispanic pictorial documents and through the written compilation of indigenous pictorial and oral accounts by Spanish and native chroniclers. The tendency of history and myth to merge in many of these accounts, coupled with their manifestly political and propagandistic intent, has led a number of modern scholars to deny their validity as a source of accurate historical data (e.g. Price 1980; Umberger 1981; Charlton 1981:155). On the other hand, some scholars have accepted the histories uncritically at face value, ignoring obvious chronological and thematic contradictions (e.g. Caamaño 1981). The most useful approach to this data base is an empirical one which steers a course between these extreme views, neither assuming nor denying historical validity a priori.

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The extent of accuracy of the native histories can be established through comparative analysis of many sources. When a number of independent sources converge, greater faith can be placed in the resulting interpretation. This approach is best exemplified by the work of Davies (1973a, 1973b, 1977, 1980), who has presented the most convincing reconstructions of Prehispanic central Mexican native history from written sources. My use of the native historical sources for chronological purposes in Chapters 2 and 3 follows Davies by taking an empirical comparative approach to the problem; considerable use is made of tables portraying how the various texts compare on key events and dates. Chapter 2 contains a reevaluation of central Mexican migration accounts which leads to the conclusion that Náhuatl speaking populations said to have come from Aztlan or Chicomoztoc arrived in central Mexico from a northern direction in the early part of the thirteenth century. One of these populations, known as the Tlahuica, settled in the area of the modern Mexican state of Morelos, and the later political evolution of Tlahuica states, particularly that of the Cuauhnáhuac polity, is reconstructed in Chapter 3.

Chapters 4 through 6 present an archaeological study of western Morelos in the Postclassic period. The data consist primarily of ceramics excavated from Postclassic contexts at the site of Xochicalco by the Xochicalco Mapping Project (Kenneth G. Hirth, director) in 1977. Postclassic ceramics excavated in other parts of Morelos were studied by the author in 1980 and 1981 (Smith 1981a, 1981b), but are not described in the present work except as they relate to the Xochicalco material; these other ceramics will be described elsewhere (Smith n.d.). Chapter 4 presents background information on the Xochicalco Mapping Project excavations and

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then outlines the approach to ceramic analysis followed here. Briefly, a non-typological attribute study was undertaken which permitted two distinct problem-oriented classifications to be performed on the same data. First, a chronological classification was carried out which formed the basis of a quantitative seriation of the Postclassic deposits at Xochicalco. This seriation, presented in Chapter 5, yields a ceramic chronology which currently stands as the most detailed and refined Postclassic sequence in central Mexico. In Chapter 6, the phases derived from the seriation are treated as ceramic complexes, and the second ceramic classification--a synchronic "cultural/functional" classification--is used as a framework for describing the Postclassic ceramics of Xochicalco by ceramic complex.

While the archaeological chronology developed in Chapters 4 through 6 is presently the most fine-grained sequence anywhere in Postclassic central Mexico, it is not presented as a "final" or "best" chronology. A major tenet of the approach to chronology taken in the present work is that there is never a "best" chronology, and that there is always room for improvement in any archaeological sequence. For this reason, the Xochicalco ceramic phases are given names rather than numbers or letters. The very act of numbering an archaeological sequence provides a false sense of finality and subsequent refinements may create awkward phase names (see Hole, Flannery and Neely 1969:5 for discussion). A numbered chronological sequence is far more likely to become "fossilized," thereby inhibiting further attempts at refinement. This appears to have been the case in Postclassic central Mexico, and the recently proposed new chronology using terms like "Second Intermediate Phase 2" and "Late Horizon" (Price 1976; Sanders, Parsons and Santley 1979:Table 5.1) is a step in the wrong

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direction (see Flannery 1977:761). I therefore use the more traditional period names of Early, Middle and Late Postclassic for the general temporal periods (not stages) covered here (see below for a summary of the dating of these periods).

Chapter 7 presents a correlation of the native historical and archaeological chronologies developed independently in Chapters 2 through 6. Although archaeologists and ethnohistorians have long called for the correlation of archaeology and native history in central Mexico (e.g. Vaillant 1938; Nicholson 1955; Bernal 1962; Nicholson 1978), most attempts at such correlation have not been successful (see Nicholson 1955, Calnek 1973, or Charlton 1981:155 for comment). There appear to be four major reasons for this, two relating to the separate data bases involved and two to the specific problems of correlation. First, the archaeological chronologies used have not been sufficiently refined to correlate with the often faster-paced events of the native histories. Second, archaeologists have tended to focus on a single historical source, thus inviting problems of bias and representation which are alleviated only when many sources are used (see Calnek's 1973 comments on Parsons 1970).

While these two obstacles to archaeological/historical correlation are internal to the two sets of data, the following two points concern the particular assumptions and methods of correlation that are employed. First, archaeologists have tended to follow the simplistic and often incorrect assumption that there is a one-to-one association of ceramic types or styles with ethnic groups (Vaillant and Vaillant 1934:121-127; Vaillant 1938; Noguera 1963). Sometimes ethnicity is expressed through ceramics and sometimes it is not; this is an empirical question to be tested and should not

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be assumed a priori. It is shown in Chapter 6 that ceramics are indeed associated with ethnicity in Postclassic Morelos, whereas they are not in the Basin of Mexico, where most previous archaeological/historical correlation attempts have been made. The final reason for the failure of correlation studies involves a lack of appreciation of and respect for the relative integrity of the two kinds of data. This issue, which is important in the present work, has been particularly mishandled in Postclassic central Mexico and has not received adequate attention in the literature; for this reason, a few words should be said before proceeding.

Archaeology and native history provide two quite distinct kinds of data, and in some cases they are simply not comparable. However, where there is comparability between the two, as in Postclassic central Mexico, it is clear that correlation and synthesis will yield a greater understanding of past change than either data base can alone. In this endeavor, the integrity of each kind of data must be respected, and each must be interpreted on its own merits before synthesis is attempted. This approach has been stated with respect to Bronze Age Greece as follows:

> It does seem to me important that in a field in which various kinds of evidence, philological, literary and anthropological, as well as archaeological, are available, they should in one important sense be kept separate. Though comparisons of findings in each must be useful at all stages, it seems to be fatal to mix elements drawn from more than one in elaborating an argument. The kind of information provided by each of them is so distinct that when intermingled they inevitably weaken the reasoning. This must, in fact, be able to stand up first to judgment in terms of the strict logic of its own discipline (Evans 1974:17).

The need to respect the integrity of the different kinds of chronological data was appreciated by Vaillant (1938:535), who argued for the separate construction of archaeological and historical sequences prior to their

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correlation (Vaillant's correlation attempts failed largely because of the three difficulties listed above; see Nicholson 1955).

Unfortunately, later scholars have not followed Vaillant in this area, and have built historical data into their archaeological sequences. This practice not only compromises the integrity of the archaeological record, but lends a false sense of precision to archaeological chronologies. The most widespread example of this problem concerns the conquest of provincial areas by the Triple Alliance. When the date of conquest is known from historical sources, and conquest is assumed to correlate with the introduction of Basin of Mexico pottery types into an area, then the archaeological phase containing these types is assigned the historical date as its starting point (e.g. Vargas 1975:223f,231ff; Angulo 1976:197f; Mason 1980:11-13,87). It is easily shown, however, that the particular Basin of Mexico ceramics involved (almost always Aztec III Black-on-Orange) were present in the conquered areas long before they were conquered by the Triple Alliance (see Chapters 6 and 7; Smith 1982); this observation invalidates the chronologies which are built on such a hybrid foundation. Other examples of such hybrid archaeological sequences are Vargas' (1975: 231-233) use of the native historical date for a migration in the Chalco area to signal a change of ceramic phase in the Toluca Valley (80 km distant) and Muller's use of the historical date for the founding of Tenochtitlan in 1325 (the actual date was more likely 1345; see Davies 1973a: 37) to date archaeological phases at both Teotihuacan (Muller 1978b:146), 40 km distant, and Cholula (1978a:109), which is nearly 100 km away. This practice is not limited to central Mexico. A similar hybrid chronology is proposed for Incaic Cuzco by Rowe (1944:57-61), who dates a ceramic phase

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transition by reference to a date derived from oral history for the accession of Pachacuti. Similarly, Chang (1977:268-271) derives dates from Chinese historical accounts to date Shang period archaeological phases.

In the present work, the native historical and archaeological records are respected as separate though complementary accounts of Post-classic culture change. The two chronologies are developed entirely independently in Chapters 2 through 6, and are not correlated until the implications of each kind of data alone are explored. Although the correlation presented in Chapter 7 is successful, no attempt is made to derive a hybrid or master chronology for further work. Even when a high degree of correspondence can be established, the elaboration of such hybrid constructs serves "only to lay up trouble for the future" (Evans 1974:18).

The region of study of the present work is the western portion of the modern Mexican state of Morelos. Morelos is a natural physiographic unit of 5000 square km defined by mountain ranges on all sides and drained by the Amacusac and Tenango Rivers which flow into the Rio Balsas in the state of Guerrero. Figure 1 shows the location of Morelos in the central highlands of Mexico. The term "central Mexico" is used in this work to denote the Basin of Mexico and surrounding valleys on the west, south and east sides. No attempt is made to define this cultural/geographical region more precisely because archaeological and historical documentation drop off rapidly as one moves away from the Basin of Mexico in any direction. It may be noted, however, that my use of the term central Mexico corresponds more

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Figure 1. Map of central Mexico, showing major regions discussed in the thesis.

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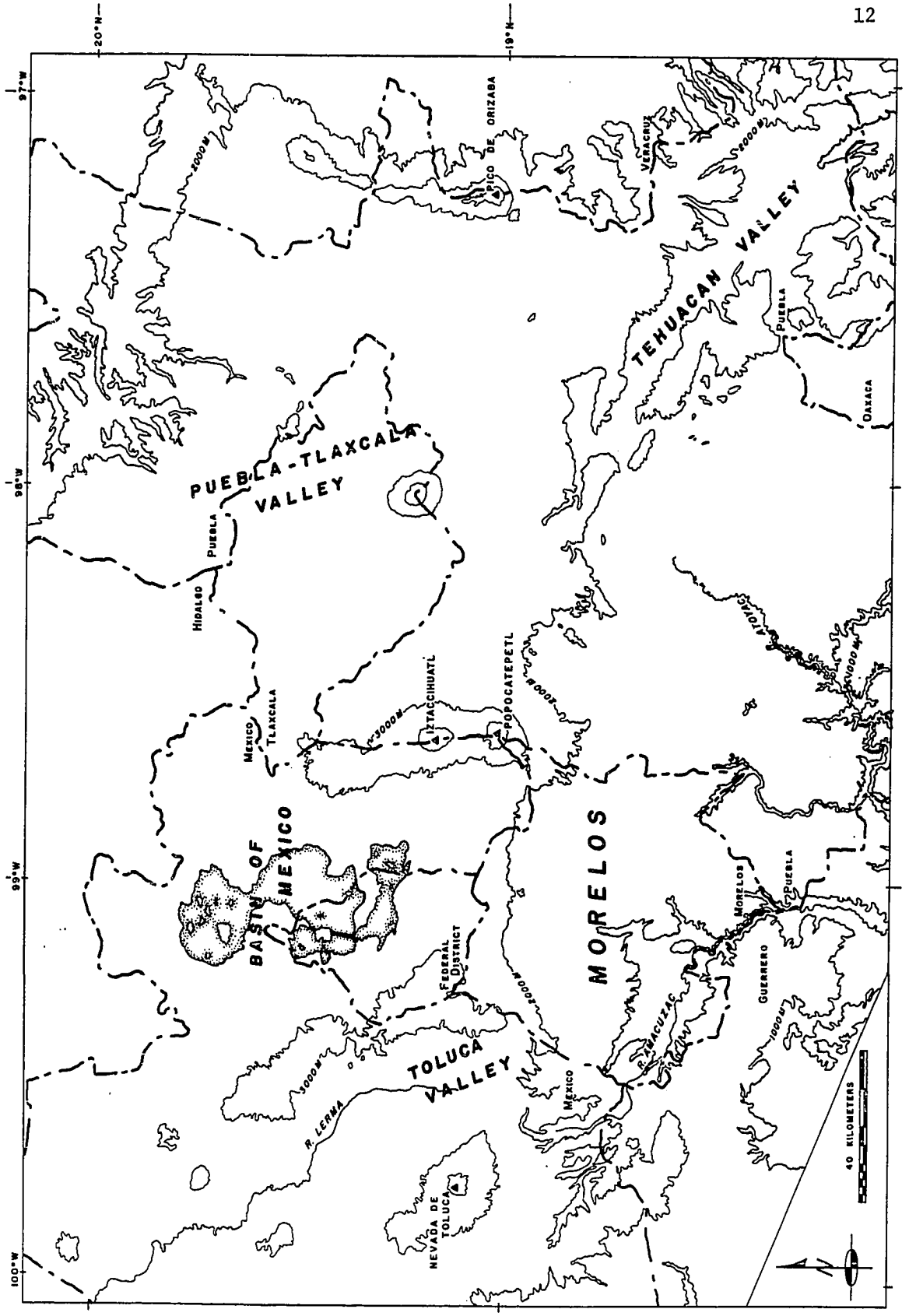

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or less to the area defined as the "Central Mexican symbiotic region" by Sanders (1956).

The chronological framework used in the archaeological portion of this work is previewed in Table 1; these and other regional sequences are discussed at length in Chapters 6 and 7. The major occupation of Xochicalco was in the Epiclassic period, denoted as Phase G in the ceramic sequence of Cyphers (1980; n.d.). The end of this phase, dated somewhere in the 900 to 950 time range (Kenneth G. Hirth, personal communication), marks the collapse of the Xochicalco state. The Postclassic ceramics analyzed in the present work come from a small site located 500 m west of the central Xochicalco ceremonial zone (which was abandoned and left unoccupied during most of the Postclassic epoch). One problematic deposit of sherds which appear to date between the fall of Epiclassic Xochicalco and the start of the Tilancingo phase have been provisionally called Phase H (see Cyphers n.d.); it is hoped that future work will allow formal definition of a ceramic complex dating to this Early Postclassic time span.

The present work is part of a larger program of research on Postclassic Morelos. Related projects currently underway by the author include analysis and description of Postclassic ceramics from other sites throughout Morelos (Smith 1981a, 1981b, n.d.); studies of economic change in western Morelos throughout the Postclassic period, based upon the chronology developed here; and analysis of Late Postclassic residential data from Xochicalco which bear on issues of craft production, social stratification, and rural social organization (Smith 1981c). The ceramic chronology presented here has permitted surface collections from Postclassic sites located by the Rio Chalma Surface Reconnaissance project

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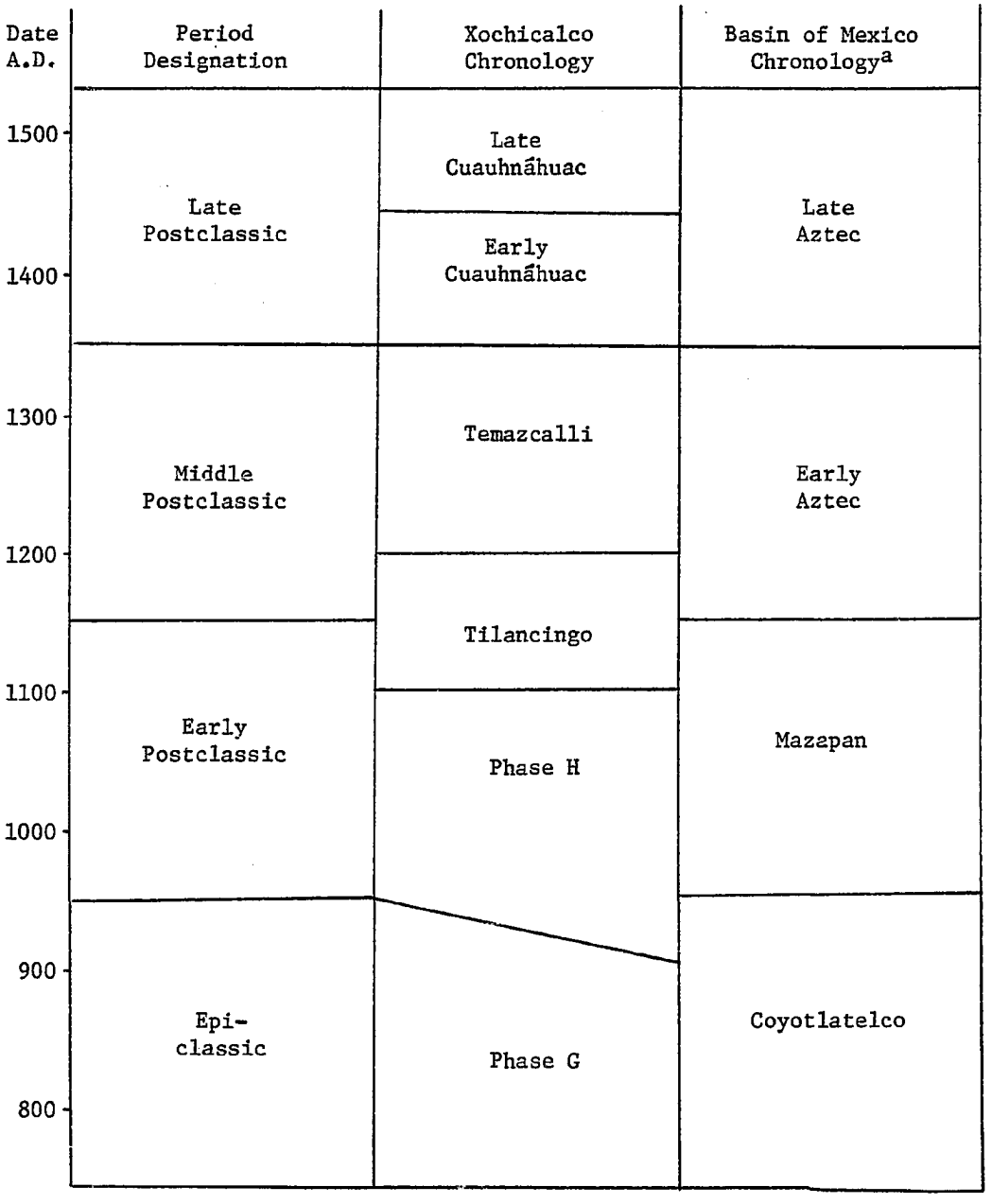
TABLE 1

CHRONOLOGICAL FRAMEWORK FOR POSTCLASSIC XOCHICALCO



[a]Taken from Sanders, Parsons, Santley (1979:457-474), although their period designations are not used.

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(Kenneth G. Hirth, director) to be dated by phase (Heath-Smith and Smith, 1982), and analysis of changing Postclassic settlement patterns in the Rio Chalma area is currently being carried out by Cynthia M. Heath-Smith.

Chronology-building is not an end in itself, but rather the first step in approaching the analysis of economic and cultural change. The full implications of the Postclassic sequence developed here will therefore not be realized until these related projects are completed. Nevertheless, it is demonstrated below that basic chronological analysis can in and of itself reveal considerable information on prehistoric change. In this sense, the present work may be seen as a response to arguments that ceramic change does not reflect historical change (e.g. Adams 1979), or that archaeological and historical chronologies cannot be correlated in central Mexico (e.g. Charlton 1981:155). Past failures in these areas result more from inadequacies of conceptualization and methodology than from inadequacies of the archaeological record.

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CHAPTER 2

ARRIVAL OF THE TLAHUICA IN MORELOS: LINGUISTICS AND NATIVE HISTORY

There is very little documentary evidence concerning events in Morelos prior to the fourteenth century. What little evidence we do have suggests that some time after the fall of Xochicalco and before the fourteenth century, Náhuatl speaking populations first settled in Morelos and displaced indigenous speakers of languages of the Oto-Mangueyan stock. In order to date the arrival of Náhuatl in Morelos, an extended analysis of central Mexican native historical sources is required.

Although much of this analysis, which fills the bulk of the present chapter, does not directly concern Morelos, it represents the only means of approaching the history of this period in the area of Morelos. Linguistic data bearing upon Postclassic Morelos are considered first. After a discussion of the pre-Náhuatl languages of Morelos, historical linguistic reconstructions dating the arrival of Náhuatl are considered. The bulk of the chapter is then concerned with a study of native historical treatments of Chichimec migrations from Aztlan or Chicomoztoc in order to date the arrival of Náhuatl speaking populations in central Mexico, some of whom settled in Morelos. Once the chronology of the Aztlan migrations has been established, the linguistic and ethnohistorical data are synthesized and applied to the specific problem of the Náhuatl settlement of Morelos.

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Linguistic Background

Pre-Nâhuatl Languages of Morelos

At the time of the Spanish conquest in 1519, the Nâhuatl language was spoken throughout central Mexico, including all of Morelos, and served as a lingua franca in much of the rest of Mesoamerica. Research in Mesoamerican historical linguistics shows that the origins of Nâhuatl, classified in the Nahuan group of the Uto-Aztecan family of languages (Kaufman 1976a:957), are to be found in northern or northwestern Mexico, and that Nâhuatl speakers first arrived in central Mexico some time during the final millenium of prehispanic times (Kaufman 1976a:958ff; Campbell 1979; Lastra de Suarez 1974; Knab n.d.). The problem of dating the arrival of Nâhuatl in central Mexico is considered in the following section; first, the question of the pre-Nâhuatl languages of central Mexico and of Morelos is considered.

The specific configuration of the pre-Nâhuatl languages of central Mexico is a problem too complex to treat fully here. In general, however, it may be inferred that the northern and western portions of central Mexico, including the Basin of Mexico, were inhabited by speakers of languages of the Oto-Pamean family--Matlatzinca, Ocuilteca, Otomí, Mazahua, and Pame (see Kaufman 1976b:113)--while areas to the east and southeast of the Basin of Mexico were inhabited by Mixtec, Popolocan or Totonac speakers (see Figure 1). Davies (1977:161; 1980:9) discusses the possibility of indigenous speakers of Otomí living alongside of immigrant Nâhuatl speakers at Tula, and Kaufman (1976b:113) says that, "Likely languages for [Classic period] Teotihuacan are then: Matlatzinca-Ocuilteco, Otomí-Mazahua, Totonac, Tepehua [a Totonac language], possibly even common Chochoan [a Popolocan

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language] or Mixtec." Manrique's reconstruction of Mexican languages at 600 B.C. (1975:Map 6) agrees with this general scenario: he has Oto-Pamean, Totonac, and "Oaxaqueño" (presumably Mixtec) covering the area of central Mexico. Native historical sources confirm parts of this linguistic reconstruction. For example, Chimalpahin (1965:74) states that, "el lenguaje primitivo de las tetzucas fue el popoloca"; this is also reported in the Histoyre de Mechique (1905:12).

Turning now to the specific area of Morelos, Náhuatl was the primary language spoken in 1519[1], with only a few scattered groups speaking other languages (see below). Prior to the arrival of Náhuatl speaking populations, the most likely languages for Morelos are Matlatzinca (and/or Ocuilteca) in western Morelos, and Mixtec and/or Popoloca in eastern Morelos. Matlatzinca and Ocuilteca are both members of the Oto-Pamean language family. Since the sixteenth century, Ocuilteca has been limited to a small number of speakers in the immediate vicinity of Ocuilan, State of Mexico. Matlatzinca is native to the central portion of the Toluca Valley, where it is thought by linguists to have a time depth of 15 centuries or more (see discussion in Quezada 1972:24). The inhabitants of Teotenango, a major ceremonial center in the Toluca Valley, were almost certainly Matlatzinca speakers during the site's major occupation in the Epiclassic period (Piña Chán 1975:543). By the sixteenth century the Toluca Valley was a multi-lingual region, with Matlatzinca, Náhuatl, and Otomí as the primary languages (Quezada 1972:Map 3). My argument for Matlatzinca as the pre-Náhuatl language of western Morelos is based primarily upon distribution data--it was the major non-Náhuatl language bordering on the western edge of Náhuatl speaking Morelos in the sixteenth century. Before considering this data, however, several supporting lines

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of evidence from archaeology and ethnohistory are considered.

The major construction and occupation of the site of Xochicalco in western Morelos took place during the Epiclassic period, several centuries prior to the postulated date of arrival of Nāhuatl in Morelos (see below). The Xochicalco glyphic corpus has only been partially analyzed (Caso 1962; 1967:166-186; Sāenz 1961; 1968), and there is need for a detailed study of the extant examples, many of which were uncovered after Caso's major analysis. Caso (1962) points out the similarity of many individual Xochicalco glyphs to examples from Teotihuacan, Monte Alban, and other Mesoamerican sites; however, the only known site with patterns of several glyphs paralleling the structure of the Xochicalco glyphic system is Teotenango (Alvarez 1975). At both sites the glyphs occur in contexts dating to the Epiclassic period, and both sites employ stone stelae (as well as other carved stone monuments) as media for the glyphs. Because the syntax of narrative glyphic representations is generally related to the structure of the language spoken in a culture (as in the case of Maya or Egyptian hieroglyphs), the Xochicalco-Teotenango similarities may point to a common language--Matlatzinca--at the two sites in a way in which simple shared individual glyphs would not. Kaufman (1976b: 113) agrees that Matlatzinca (or Ocuilteca) is the most likely language for Xochicalco, although his statement, "The Xochicalco culture occupied more or less the region of presentday Matlatzinca and Ocuiltec" is incorrect. These languages are today limited to the Toluca Valley and adjoining mountains to the southeast, both within the modern state of Mexico, while there is no evidence that the Xochicalco culture embraced areas outside of Morelos. Litvak (1972:68f) mentions archaeological evidence of trade and

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communication between Xochicalco and the Matlatzinca of the Toluca Valley, though he does not use this data to make linguistic inferences.[2]

In addition to this archaeological evidence, there is some ethnohistorical data suggesting that Matlatzinca may have been spoken in western Morelos during the Toltec period. The Historia Tolteca-Chichimeca (1947:68) lists 20 towns associated with Tollan; it is not clear whether these are meant to be subjects or allies of the Toltec capital (see Davies 1977:302-307). Kirchoff (1961:251f) arranges these towns into five geographically localized groups or provinces, which are interpreted as corporate or ethnic entities of some kind (pp. 258 f). Two of the four towns in the southern group--Zacanco and Cuixcoc--are specifically mentioned as Teotenanca [i.e. Matlatzinca] towns by Chimalpahin (e.g. Chimalpahin 1965:131; see Kirchoff 1961). Kirchoff (1961) then suggests that the remaining two towns of the southern group--Quauhchichinolco and Chiuhnauhtlan --are also Teotenanca towns. Both Zacanca and Cuixcoc are located in the Toluca Valley, while Chiuhnauhtlan may be identified with either Chiuhnauhapan or Chiuhnauhtenco, both located in the Toluca Valley as well. As for the fourth town, Kirchoff says, "'Quauhchichinolco' hoy Cuachichinola," (Kirchoff 1961, quoted in Tommasi 1978:19) and states that it lies to the southeast of Teotenango. Cuauchichinola is a town in western Morelos which lies in a southeasterly direction from Teotenango, and I have been unable to locate a place of the same name in the Toluca Valley. Thus if Kirchoff's grouping of Toltec-period towns is valid, and if these groups had some kind of ethnic identity, as Kirchoff suggests (see also Davies 1977:306f on this), then the suggestion that Cuauchichinola, Morelos was a Matlatzinca town in the Early Postclassic

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(Toltec) period is not unreasonable. It might then be possible to infer that at this time, all of western Morelos was inhabited by Matlatzinca speaking populations and that Nâhuatl had not yet arrived.

As mentioned above, the Toluca Valley was a multi-lingual area at the time of the Spanish conquest, with Matlatzinca as a dominant language (Quezada 1972:26-28). South of this area, Matlatzinca speakers are reported from a number of parts of northeastern Guerrero in the sixteenth century. Iguala and Tlacozauhtitlan were both primarily Nâhuatl speaking regions, but each also had a significant number of Matlatzinca speakers as well (Relación de Iguala 1931:221; Relación de Tlacozauhtitlan 1905: 249). Tepecoacuilco (near Iguala), according to a sixteenth century document (Martinez 1897:197), contained Matlame speakers, as did several towns southeast of this area (Marino Flores 1958/59:Map 1). Carrasco explains that Matlame is either another name for Matlatzinca (1950:42) or else a closely-related language or dialect (1976:46). Barlow (1948a:182) suggests that prior to the fifteenth century, Matlatzinca extended over much of the northeastern Guerrero north of the Rio Balsas, and was later fragmented by the arrival of Chontal (and perhaps Mazatec) speakers (see also Marino Flores 1958/59). These data indicate that Matlatzinca (together with Nâhuatl) was spoken all along the western borders of Morelos at the time of Spanish conquest, with enclaves of Otomí and Ocuilteca in the northern portion of this area, and Chontal and Mazatec in the southern portion.

The only reference to Matlatzinca speakers in sixteenth century Morelos is found in an early census of Molotla (perhaps part of Yauhtepec) analyzed by Carrasco (1976), in which 17 of the 128 households listed are

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said to be Matlame speaking (1976:46). In the nineteenth century, the introduction (Anonymous 1862:197) to Guevara's 1638 Matlatzinca grammar (Guevara 1862) states that, "El idioma matlatzinco se habla todavía en muchos pueblos cercanos a Toluca y a Cuernavaca" (Quezada 1972:29 incorrectly cites this nineteenth century introduction as a sixteenth century source; however, she later quotes it again on page 33 as a nineteenth century reference). Quezada (1972:33) also cites Leon (1903:60) as mentioning the presense of Matlatzinca speakers in nineteenth century Cuernavaca. By 1970, there were either no Matlatzinca speakers left in Morelos, or else the number was so small that they were lumped into the "other" category of the linguistic census data reported by Horcasitas de de Barros and Crespo (1979:85).[3]

Turning now to eastern Morelos, there are fewer data bearing on the question of the pre-Náhuatl languages of the area. Paddock (1976:309) asserts, without supporting evidence, that in 1000 B.C., "Morelos era todavía una parte de la Mixteca." In 1970, Mixtec was the most common non-Náhuatl indigenous language in Morelos (see note 3). However, speakers of Mixtec (as well as Zapotec and Otomí) were scattered among the municipios of the state, and Horcasitas de Barros and Crespo (1979:85) attribute the 1970 presence of these languages to recent immigration. The Mixteca Baja, the northernmost section of the traditional zone of Mixtec culture, extends into the state of Puebla as far north as Acatlan (Smith 1973:5). While the area north of there is not usually referred to as part of the "Mixteca," Mixtec in 1970 was still the dominant indigenous language in several municipios north of Acatlan, extending up to Chigmecatitlan (Horcasitas de Barros and Crespo 1979:115).

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In the sixteenth century, it appears that Mixtec and Popoloca were spoken, in addition to Náhuatl, in the portion of southwestern Puebla which borders on Morelos. Olivera (1976:186f) reports the presence of both of these languages in the Cuauhtinchan polity (at the northeast limit of this part of southwestern Puebla), while Jimenez-Moreno summarizes the situation as follows:

> Certainly peoples who spoke Nahua, Chocho-Popoloca, and Mixtec lived intermingled in southern Puebla in the sixteenth century, particularly in the zone of Matamoros Itzocan [modern Izucar], Acatlan, and Tepeji; Mixtec is still spoken today as far north as Chigmecatitlan (Jimenez-Moreno 1970:62).

In summary, sixteenth century linguistic distribution data, supplemented by archaeological and ethnohistorical inferences, suggest that prior to the arrival of Náhuatl in Morelos, Matlatzinca (and/or Ocuilteca) was spoken in western Morelos, with either Mixtec and/or Popoloca as the language(s) of eastern Morelos.

Dating the Arrival of Náhuatl in Morelos

Because there is little information concerning the date of arrival of Náhuatl in the specific area of Morelos, this problem must be approached through a consideration of the arrival of Náhuatl in central Mexico generally. A number of archaeologists (e.g. Coe 1977:99) and ethnohistorians (e.g. Jimenez-Moreno 1970:43, 59; 1974:10ff) postulate Náhuatl as the language of the inhabitants of Classic period Teotihuacan, thus implying that the language had arrived in central Mexico before or at the start of the Classic period. These arguments are based on questionable ethnohistorical interpretations (e.g. the association of Classic Teotihuacan with the Tollan of the historical traditions) and do not incorporate

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linguistic data. Although one linguist (Manrique 1975:Map 9) suggests that Nāhuatl was already in central Mexico by A.D. 400, the present consensus in Mesoamerican historical linguistics is that the language did not reach central Mexico until after the fall of Teotichuacan in the seventh or eighth century A.D. Kaufman (1973:462) initially suggested A.D. 600 as the date of arrival for the first Nāhuatl speakers in central Mexico, and associated them with the fall of the Teotihuacan state. He later (1976b: 115) moved this date up to the Epiclassic period; it is worth quoting his conclusions on the history of Nāhuatl in central Mexico:

1. The Toltecs probably spoke Nahua.
2. The Teotihuacanos can hardly have spoken Nahua--despite Coe's speculation.
3. The Cotzumalhuapa culture, even if only Late Classic, can hardly have been Nahua-speaking.
4. The earliest Meso-American culture that may have spoken Nahua is probably the Coyotlatelco culture in the Valley of Mexico (Kaufman 1976b:115).

Supporting evidence for these points is presented in the original article (Kaufman 1976b:113-115); Campbell (1979) is in essential agreement with Kaufman on Nāhuatl. Knab (n.d.) reaches similar conclusions in his analysis of Nahua diversification, while Luckenbach and Levy's (1980:458f) glotto-chronological data would appear to support Kaufman's earlier date for the Nāhuatl penetration of central Mexico (they give A.D. 543). However, there are some problems with Luckenbach and Levy's analysis which when rectified modify their conclusions (T. Knab, personal communication); such modification advances the date of Nāhuatl arrival in central Mexico to approximately A.D. 800 (using their lexical data), which is more in line with the conclusions of Kaufman, Knab, and others.[4]

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Whether or not Nāhuatl speakers were in central Mexico during the Epiclassic period, linguists and ethnohistorians agree that there is little doubt Nāhuatl was spoken at Tula in the following Early Postclassic Period (documentary data is discussed by Davies 1977:163,168; and 1980:9; see for example Sahagún 1950-69, bk. 10:170). It is likely that the Tula population was multi- or at least bi-lingual, with Otomí spoken along with Nāhuatl. From Toltec times until the Spanish conquest, the Basin of Mexico presents a complex picture of multi-lingual and multi-ethnic polities, with numerous migrations, conquests, and other mechanisms of linguistic diffusion. Within the considerable linguistic complexity of Postclassic central Mexico, an overall trend of "Nahuatization" is evident, such that the whole Basin of Mexico and most of surrounding central Mexico were predominantly Nāhuatl speaking by 1519 (see Davies 1980 on this situation).

There is little linguistic data bearing directly on the date of arrival of Nāhuatl in Morelos. If it is accepted that the Toltecs (ca. A.D. 950-1175) were the first Nāhuatl speakers in central Mexico (Kaufman 1976b:115; Campbell 1979:968ff), then given the distance between Tula and Morelos and the north-to-south direction of Nāhuatl movement, a reasonable range for the introduction of the language into Morelos would be roughly A.D. 1000 to 1300. Documentary sources leave no doubt that Nāhuatl was spoken all over Morelos at the time of the Spanish conquest (see note 1), though small enclaves of Matlatzinca speakers were present (see above). The Nāhuatl spoken in Morelos in the sixteenth century was noted by a number of commentators to have different pronunciation than the Nāhuatl of Texcoco or Tenochtitlan in the Basin of Mexico. For example, Durán (1967,II:23) states that the Tlahuica of Morelos were "gente por cierto muy tosca y de

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basto frasis," while Ponce (1873,I:198) says of the natives of Morelos, "hablan de lengua mexicana [Náhuatl], aunque no tan cortada como en México" (see also Relación de Yacapichtlan n.d.:225; Relación de Huaxtepec 1930:36). While it is impossible to ascertain the nature and extent of these differences, they may represent incipient dialectical divergences. If this is the case, it might imply a time depth of several centuries prior to 1519 for Morelos Náhuatl, in line with the above suggestions on the arrival of the language in Morelos.

Postclassic Migrations into Central Mexico

The arrival in the Basin of Mexico of waves of immigrants from a northern direction is one of the major themes of central Mexican native historical accounts. While many of the details of these accounts may belong more to the realm of mythology than history (Nicholson 1971:66), it cannot be doubted that major influxes of populations did occur during the Postclassic period (Davies 1980; Nicholson 1978; Carrasco 1971). Many of these migrant peoples were Náhuatl speaking, and they may represent the initial penetration of this language in the area of central Mexico, in line with the historical linguistic reconstructions mentioned above. A number of the ethnohistorical accounts specifically include the Tlahuica among the migrating Náhuatl groups, and in this section I attempt to determine what the migration chronicles can contribute to an understanding of Postclassic culture history in Morelos.

Before proceeding, a few words should be addressed to the problem of the historicity of the migrations. Modern judgments of the historicity of these accounts range from the liberal view of Carrasco (1950, 1971),

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who appears to accept most of the accounts at face value as historically accurate, to the conservative position of Nicholson (1971:66), who is "Skeptical of the historicity of these migration accounts." While Nicholson does accept the occurrence of Postclassic migrations into central Mexico from the north, he assigns the migration chronicles to a stage before "genuinely historical" accounts begin (1971:47). An intermediate position is taken by Kirchoff (1948) and Davies (1980), who accept the existence of a number of waves of Chichimec immigrants and attempt to relate these events to the sociopolitical dynamics of Postclassic central Mexico, without necessarily accepting as historical fact all of the details of the accounts. This perspective, which is also espoused by Gibson (1964: 9,21) and Nicholson (1978) in a later article, is taken here. Price's (1980) contention that the "Aztecs" (Mexica) were native to the Basin of Mexico and that no southward migrations took place in Postclassic central Mexico, is based upon a highly idiosyncratic and unsupported interpretation of Mesoamerican linguistics (e.g. that Nāhuatl was always spoken in the Basin of Mexico) and upon a very selective and biased reading of a few native historical accounts; her notions cannot be taken seriously.

One other possible objection to the interpretation of these accounts as historically accurate concerns the ideological role of the migration accounts in later Mexica political cosmology. Umberger (1981), for example, suggests that because these and other native historical chronicles were used by the Mexica to justify their rule through an elaborate state cosmology, they should not be interpreted as historically valid texts. Two arguments may be advanced against such a notion. First, on a general level, Vansina (1965:49ff) has shown that "official

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traditions," or accounts whose "function is to justify the existing political structure" (1965:51) are still valid as sources of historical information. The central Mexican histories, although transmitted orally (see Calnek 1978), relied upon pictorial devices to delineate the passage of years and the nature of the major events included; thus their reliability as "historical" sources is considerably greater than the oral traditions analyzed by Vansina (1965). On a more specific level, not all of the sources consulted in my analysis of the composition of the migrant groups are Mexica in origin, while few of the sources consulted in the dating of the migrations derive from Mexica state traditions. Even accepting the "biased" nature of many of the native historical sources, the method of textual comparison (Vansina 1965:121-139) can compensate for this (see Davies 1973a, 1973b, 1977, 1980 for examples). Significantly, none of the authors denying the historical validity of the native histories (e.g. Price 1980; Umberger 1981) consult more than a few sources in their discussions.

The ethnohistorical treatments of Postclassic migrating populations may be divided into two themes. The more common theme refers to Chichimecs, Toltecs, or derivations of these terms (Teochichimecs, Tolteca-chichimecs, etc.) as the central Mexican immigrant peoples. "Chichimec" and "Toltec" are general terms which are usually not associated with any particular ethnic or linguistic group. The former refers primarily to non-sedentary hunting populations living to the north of central Mexico, although it can also designate simple farming groups in the north. In the context of the migration accounts, however, the term is extended to cover central Mexican immigrant populations whose ancestors had been either hunters or northern

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farmers--that is, descendents of "true" Chichimecs (Kirchoff 1948:83). The term Toltec, on the other hand, designated on a general level the "civilized" element in central Mexican culture--city-dwelling agricultural populations with a long history of sedentary life. It also referred more specifically to the residents of Tollan, the Toltec capital (see Davies, 1977:55; 1980:3-22; Kirchoff 1948).

These two concepts--Chichimec and Toltec--were important components of ethnic identity in sixteenth-century central Mexico. The Toltec element emphasized a continuity of sophisticated urban culture and at the same time provided a sense of political legitimacy to those Late Postclassic polities who could trace their lineages to the Toltec kings (Davies 1973a:22ff). In contrast, Davies describes the Chichimec element of ethnicity as follows:

> The claim to rustic--or "Chichimec"--ancestors lent color to tales of tribal origins and satisfied a Mesoamerican yearning for a pedigree that spelled progress from rags to riches . . . the "rags to riches" legend almost amounted to a status symbol. (Davies 1980:85,86).

Both of these terms are used in the ethnohistorical accounts to describe various migrating groups, although the term Chichimec is much more common in this context.

The second major theme in the native accounts of Postclassic migrating groups concerns specific named ethnic groups who migrated to central Mexico from Aztlan or the seven caves of Chicomoztoc. In this theme, the Mexica constituted the last of a series of Náhuatl groups who made the southward journey into the Basin of Mexico and surrounding areas. Because the majority of the native historical sources are Mexica in origin, many details of the migration of this particular group are preserved, including the towns visited, various events along the way, and the chronology, at least relative, of the journey (see, for example, Acosta

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Saignes 1946; Davies 1973:1-34). In the face of this relatively abundant data on the Mexica migration, scholars have tended to pass quickly over the scanty information on the other Nāhuatl groups preceding the Mexica in the Aztlan accounts. Because the Tlahuica are often mentioned as one of these groups, however, some space is devoted below to a detailed consideration of this neglected data.

The precise relationship between the Chichimec (and Toltec) migrants of the first theme and the named Nāhuatl groups of the second theme is difficult to determine. Most native historical sources discuss only one of the two themes, and those that do contain both themes tend to discuss them separately without explicitly tying the two together (e.g. Chimalpahin 1965; Torquemada 1969). Modern students of central Mexican native history are of little help here. Treatments of the Aztlan theme generally focus on the Mexica migration, ignoring the pre-Mexica groups and their possible relationship to the Chichimecs (e.g. Acosta Saignes 1946; Davies 1973:1-34; Calnek 1978:253-264); similarly, discussions of the Chichimec and Toltec migrations usually ignore the Aztlan theme or only mention it briefly (e.g. Nicholson 1978; Davies 1980; Carrasco 1971; Kirchoff 1948). A comparison of the two migration themes, however, reveals considerable temporal and geographical overlap between the events portrayed. This finding, together with passages calling the named Nāhuatl groups of the Aztlan theme "Chichimecs" and/or "Toltecs" (e.g. Ixtlilxochitl 1975, I:306f; Sahagūn 1950-69, bk.10:197; Chimalpahin 1965:66) suggests that the Chichimec theme and the Aztlan theme in large part describe the same migrations. Specifically, it is argued here that the Aztlan migrations are a subset of the overall Chichimec migrations, comprising all but the earliest of

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these movements of peoples.

Before turning to the Aztlan migration theme which is the major focus of this chapter, some space is devoted to a review of the Chichimec migration theme. The period from ca. A.D. 1100 to 1400 was characterized by a general deterioration of climate in northern Mesoamerica. Annual rainfall declined, and as a result the Mesoamerican frontier--marked by the rainfall requirements of maize agriculture--moved progressively southward. Armillas (1969) presents the data for this change, and correlates the climatic shift with the southward migrations of Chichimec populations which began at roughly the same time. These migrating groups of northern origin probably played a role in the destruction of Tollan in about 1175 (see Davies 1977:410-414, 441-446) though the nature of that role is difficult to determine (Davies 1977:398-408). In the majority of the native historical accounts[5], the Chichimec migrants did not arrive in the Basin on Mexico and adjacent valleys until after the fall of Tollan (see Davies 1980:114; Nicholson 1978:295; Carrasco 1971:459; Armillas 1969:701). Aside from the Anales de Cuauhtitlan (1975:3), whose seventh-century date for Chichimec migrations is almost certainly incorrect (see Nicholson 1978: 284f), the major evidence for Chichimec migrations into the Basin of Mexico before the fall of Tollan is found in the Historia Tolteca-Chichimeca (1947:75-100). Davies interprets these accounts of migrating Tolteca-Chichimeca and Teochichimeca as follows:

> 1. The Tolteca-Chichimeca left Tollan [for Cholula] some time before its final period of disaster.
> 2. Mixcoatl and his group formed part of the Chichimec rescue operation, following the appeal for help from the Tolteca-Chichimeca in Cholula (Davies 1977:363).

The date of the first event is given as 2 Tochtli (Historia Tolteca-

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Chichimeca 1947:77), which corresponds to either 1122 or 1130, depending upon whether the Chalca year count (Davies 1977:364) or the Tenochca count (Historia Tolteca-Chichimeca 1947:77) is employed. On the basis of this episode, Davies concludes that "some Chichimec migration into the Valley of Mexico seems to have begun well before the end of Tollan" (Davies 198C:162).

Following Davies, it would appear that some Chichimec migration into the Basin of Mexico began early in the twelfth century, but that the majority of the migrations took place in the final decades of that century and on into the thirteenth century. A rough terminal date for the Chichimec migrations is signalled by the arrival of the Mexica in the Basin of Mexico during the mid-thirteenth century (see following section). While southward movements of Chichimec populations may well have continued after this time, such late migrations would have had little impact upon the sociopolitical dynamics of central Mexico and are not dealt with by the Mexica- and Acolhua-centered native historical accounts.

The Chichimec migrants described under the "Chichimec" theme probably represent a mixture of ethnic and linguistic affiliations. As Davies puts it,

> The Chichimecs, or Tolteca-Chichimecs as I prefer to call them, who penetrated to Tollan and beyond in the twelfth century are unlikely to have been of homogeneous stock; their numbers surely included disparate elements, differing in their cultural attainments and ethnic affiliations (Davies 1980:79).

Davies presents a convincing argument that many if not most of these early Chichimecs were Otomí-speakers (1980:74-79). It is significant that those sources which explicitly equate the Chichimecs with Otomís (e.g. Historia Tolteca-Chichimeca 1947:93; Historia de los Mexicanos 1941:216) do not also call the migrant Náhuatl groups of the Aztlan theme Chichimecs, while

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those sources which do call these latter groups Chichimecs do not also equate Chichimecs with Otomís (e.g. Ixtlilxochitl 1975, I:306f; Sahagún 1950-69, bk.10:197; Chimalpahin 1965:66). This separation of sources suggests that the initial Chichimec migrants were primarily Otomí-speaking while the later Chichimec groups consisted of Náhuatl-speakers. In addition to Otomí and Náhuatl, Pame has been argued as a possible language for at least some of the early Chichimec migrants (Carrasco 1950:244), while some sources speak of a "Chichimec" language which is explicitly said to differ from both Náhuatl and Otomí (Relación de Chicoloapan 1905: 80; Relación de Coatepec 1905:42).

The Aztlan Migration Theme

The Aztlan migration theme consists of lists of explicitly-named ethnic groups who migrated from Aztlan and/or Chicomoztoc to the Basin of Mexico and surrounnding valleys. Whenever the sources mention the language of these groups, it is invariably Náhuatl; in fact these groups are often referred to as "in naoatlaca" (Sahagún 1950-69, bk.10:197) or "los nahuatlaca" (Códice Ramirez 1944:17; Acosta 1940:514; Clavigero 1964:63). The Mexica were the last of the Náhuatl groups to migrate south from Aztlan, and this fact, together with the Mexica origin of much of the preserved native history, has led to an overemphasis upon this final migratory episode at the expense of the earlier Náhuatl migrations; we simply know very little about these other groups prior to their settlement in central Mexico.

I have been able to locate 16 separate discussions of the Aztlan migration theme in the central Mexican native historical sources; these

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are listed in Table 2 (four sources have been combined under the Crónica X, source number 1). Vaillant and Vaillant (1934:table 4) first compiled such a chart comparing sources and groups of the Aztlan theme (see also Vaillant 1938:550); however, their table contains many inaccuracies and is not complete (see Nicholson 1955:599 for a critique of Vaillant's use of historical sources). Other tabular comparisons of the sources on the Aztlan migration theme include Acosta Saignes (1946) and Calnek (1978: 263f), but these address problems other than those under consideration here. The major questions to be asked of the data in Table 2 are: (1) who were the migrant Náhuatl groups?; and (2) in what order did they migrate? Consideration of these questions permits an approach to the problem of the arrival of the Tlahuica in Morelos.

The Sources

Native historical sources on the Aztlan migration theme may be divided into two categories on the basis of whether they explicitly state that the Náhuatl groups migrated consecutively, one after another (sources 1 to 4), or whether they merely list the groups without stating whether there is any temporal or other significance to the ordering of the list (sources 5 to 13). The ordering of the various Náhuatl groups is indicated for each source in Table 2; for sources 1 to 4 this is the stated arrival order, while for sources 5 to 13 this is merely the order in which the groups are listed in the text (which may or may not be significant).

1. Crónica X. A comparison of sixteenth-century historical sources leads Barlow to postulate the existence of a now-lost native

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TABLE 2

NÁHUATL GROUPS OF THE AZTLAN MIGRATION THEME AND THE ORDER OF THEIR MIGRATION

	Migrating Groups \ Sources	1. Crónica X	2. Chimalpahin A	3. Sahagún A	4. Anales de Tlatelolco	5. Torquemada A	6. Torquemada B	7. Chimalpahin B	8. Sahagún B	9. Códice Aubin	10. Historia de los Mexicanos	11. Códice Azcatitlan	12. Tira de la Peregrinación	13. Códice de 1590	Total number of mentions
CHICHIMECS	Chichimeca	-	-	1	-	1[d]	*[m]	*[m]	-	*[m]	-	*[i]	*[j]	-	2
	Michoaque	-	-	2	-	-	-	-	-	-	-	-	-	-	1
BASIN OF MEXICO	Xochimilca	1	1	-	2	7	5	3	-	3	2	6	6	1	11
	Chalca	2	2	5	3	3[e]	1	2[f]	3	2	5	7	7	7	13
	Tepenaca	3	3	3	1	6	3	7	1	7	6	2	2	5	13
	Acolhua	(4)[a]	4	4	4	2	(7)[m]	(6)[m]	2	(6)[m]	7[g]	-	5[k]	3	12
	Culhua	*	-	-	6	-	-	-	-	-	1	-	5[k]	4	4
	Cuitlahuaca	-	-	-	7	-	6	4	-	4	3[h]	5	5[k]	(2)[l]	8
	Mizquica	-	-	-	8	-	8	-	-	-	4	-	-	-	3
	Amecameca	-	8	-	-	-	-	-	-	-	-	-	-	-	1

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TABLE 2 (continued)

Migrating Groups \ Sources		1. Crónica X	2. Chimalpahin A	3. Sahagún A	4. Anales de Tlatelolco	5. Torquemada A	6. Torquemada B	7. Chimalpahin B	8. Sahagún B	9. Códice Aubin	10. Historia de los Mexicanos	11. Códice Azcatitlan	12. Tira de la Peregrinación	13. Códice de 1590	Total number of mentions
SURROUNDING VALLEYS	Tlahuica	5	5	-	9[c]	8	-	-	4	-	-	(3)[i]	(3)[j]	-	7
	Tlaxcalteca	6	6	7	-	-	-	-	-	-	8[g]	-	-	-	4
	Huexotzinca	-	-	6	5	-	-	1	6	1	9[g]	8	8	6	9
	Matlatzinca	-	7[b]	-	11	-	2	8	7	8	-	1	1	-	8
	Malinalca	-	-	-	12	-	4	5	-	5	-	4	4	-	6
	Cohuixca	-	-	-	10	-	-	-	5		-	-	-	-	2
MEXICA	Mexica	7	-	8	13	-	9	-	-	-	-	-	-	-	4[n]

*An asterisk indicates groups which I believe to be incorrectly listed in one of the sources; the preferred interpretation is given in parentheses, and each such modification is discussed in these notes.

[a]The sources deriving from the Crónica X (see text) all list "Culhua" as the fourth group, but it is clear that they are actually referring to the Acolhua of the Texcoco area. For example, Durán (1967,I:21) lists Culhua, but then refers to this group on the following page as "la tribu tezcucana" (i.e. the

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TABLE 2 (continued)

Acolhua); similarly Acosta (1940:515) mentions "los que poblaron a Tezcuco, que son los de Culhua." This confusion of Culhua and Acolhua is fairly common in the native historical sources, as both Davies (1980: 178) and Gibson (1964:471, note 43) point out.

[b]Chimalpahin lists "Teotenanca" as the seventh group; I follow Piña Chán (1975) in the interpretation of this as a synonym for Matlatzinca.

[c]Group 9 in the Anales de Tlatelcoco is "Quauhnahuaca," a synonym of Tlahuica (see below).

[d]Groups 4 and 5 in Torquemada A are Olmeca and Xicalanca, respectively; these are omitted from the table for reasons of space.

[e]The third group in Torquemada A is "Chalmeca," which I interpret as Chalca. Torquemada discusses these two groups separately, but appears to be referring to a single group; for example his description of "la Provincia de Chalco" (1969,I:261) is almost identical to that of "la Provincia de los Chalmecas" (p. 262); similarly, Muñoz Camargo (1892:19) speaks of "los Chalmecas, que fueron los de la provincia de Chalco."

[f]Chimalpahin B gives "Chalcas totolimpanecas" as the third group. Of the many ethnic groups that are listed as migrating to the Chalco area (Chimalpahin 1965; Anales de Cuauhtitlan 1975), it is the Totolimpaneca who are said to have come from Aztlan/Chicomoztoc (see Kirchoff 1954/55:297). However, in other places, Chimalpahin (1965:129; 1958:16,40) states that the Totolimpaneca left Aztlan after the Mexica; this probably refers to a separate group of the same name.

[g]The Historia de los Mexicanos (1941:219) lists six groups who came from Aztlan (nos. 1 to 6), and then says, "Estos pueblos dicen los mexicanos que salieron, y no más, aunque los de Tazcoco y Tazcala y Guejocingo dicen y se glorian dello, que vinieron cuando los de México, y que son de su tierra." I therefore list Acolhua (i.e. from Texcoco), Tlaxcalteca and Huexotzinca as the seventh, eighth and ninth groups in this source.

[h]Group 3 in the same source, which is not noted for its accuracy of spelling, is listed as "Atitlalabaca." I interpret this as Cuitlahuaca, since the pronunciation is similar. Also, the fourth group in the Historia de los Mexicanos is Mizquica, and the only other sources who list the Mizquica (nos. 4 and 6) also precede them in order by the Cuitlahuaca.

[i]Glyph number 3 in the Códice Azcatitlan is a bow (tlahuitolli). While it is glossed as "Chichimec" in the Codex, this is probably an error and should be changed to Tlahuica (see discussion in the text).

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TABLE 2 (continued)

[j]There is a difference of interpretation of the unglossed bow glyph in the Tira de la Peregrinación, with some students reading Chichimec and others Tlahuica; the latter is probably correct (see text for discussion).

[k]There is disagreement over the reading of the fifth glyph in the Tira. The corresponding glyph in the Códice Azcatitlan is glossed "Cuitlahuaca," and Nicholson (1973:21) reads the Tira glyph similarly. However, this glyph is quite distinct from other examples of the Cuitlahuaca sign (e.g. Códice Mendoza 2v; Códice Xolotl 1951:plates 4,5,6), or from other relevant place signs as well. Davies (1980:178) and Anonymous (1944:14) read the glyph as Acolhua; Corona y Nuñez (1964:8) as Colhua; and Chavero (1892:7) and Orozco y Berra (1960,III:64; 1864:91f) interpret it as Cholulteca. I would favor Acolhua for glyph 5 of both sources 11 and 12, since the Acolhua are listed in every other source, while the alternative groups are relatively rare among the Aztlan migrants; this is not a certain interpretation, however.

[l]The second glyph of source 13 is left uninterpreted by Chavero (1892:8), while Vaillant and Vaillant (1934:Table 4) give both Cuitlahuaca and Cholulteca as possible readings. This source has not been consulted in the original.

[m]As explained in the text, "Chichimec" in sources 6, 7, and 9 probably refers to Acolhua.

[n]While the Mexica are included in the same list as the other groups in only four of the sources, they are mentioned or implied as following the other Aztlan groups in virtually all of the sources listed.

chronicle which was presumably written in Nāhuatl by a native historian, containing glyphic elements in addition to the prose narrative (1945:69). Both Durán (1967; written in 1581) and Tezozomoc (1975; written in 1598) derive from this source, the "Crónica X," while Tovar (1972), Acosta (1940), and the Códice Ramirez (1944) all derive from Durán's or Tezozomoc's version of the Crónica X. The Aztlan migration theme, in terms of the groups listed and the order of their migration, is identical in all of these sources although Tezozomoc does not deal with the theme at all (see Durán 1967, II:21; Códice Ramirez 1944:19-22; Acosta 1940:515; Tovar 1972:10). Clavigero (1964:63) also presents identical data.

2. Chimalpahin A. (Chimalpahin 1965:75).

3. Sahagún A. (Sahagún 1950-69, bk.10:195).

4. Anales de Tlatelolco (1948:31f).

5. Torquemada A. (Torquemada 1969, I:256f).

6. Torquemada B. (Torquemada 1969, I:78). In this account, Torquemada first lists four migrant groups--Mexicana, Tlacochcalca, Chalmeca, and Calpilca. He then says that "otros dicen, que estas familias, eran nueve: conviene a saber, Chalca, Matlatzinca, Tepaneca, . . ." (Torquemada 1969, I:78). I include here only the latter list of nine groups, since the first four do not pertain to the Aztlan theme.

7. Chimalpahin B. (Chimalpahin 1965:65f).

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8. Sahagún B. (Sahagún 1950-69, bk.10:197).

9. Códice Aubin (1963:Plate 3). See the commentary of Dibble (1963:18).

10. Historia de los Mexicanos (1941:219).

11. Códice Azcatitlan (1949:Plate 3). See Barlow 1949a.

12. Tira de la Pergrinación. (Anonymous 1944:14; Corona y Nuñez 1964:8). Sources no. 11 and 12 are both pictorial codices which exhibit identical series of 8 glyphs for the Nāhuatl migrant groups. These glyphs have been labelled with the names of the groups in the Azcatitlan codex, while the Tira is unglossed. For the former, the written names are utilized in Table 2; nevertheless, there is reason to believe that at least one of these glosses--"Chichimec" for the third group--is incorrect (this is discussed below). The unlabelled glyphs in the Tira de la Peregrinación have given rise to disagreements over the interpretation of both the third and the fifth glyphs (see notes j and k to Table 2).

13. Codex of 1590 (Boban 1891:22; Chavero 1892:7-8).

The Migrants

Except for the "Chichimecs," all of the groups listed under the Aztlan theme are ethnic groups which existed in central Mexico at the time of the Spanish conquest. However, these peoples in all likelihood did not exist as corporate ethnic groups before or during their migration. Rather, successive waves of related Nāhuatl populations probably moved into

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the various territories of central Mexico and then took the names of those areas. This situation is described by Chimalpahin:

> Pero estos nombres que han sido enumerados [Xochimilca, Tepaneca, etc.], entonces aún no los poseían y solamente eran conocidos como chichimecas teocolhuacas. Pero como era la costumbre que cuando alguno marchaba de su pueblo y se iba a establecer a otro pueblo de los que ya existían desde antes, que ese tal tomase en su boca como su nombre el proprio nombre del pueblo al cual se había traslado (Chimalpahin 1965:66).

If Chimalpahin is correct in associating the names of peoples more with localities than with ethnic origins, then we should expect diverse ethnic or linguistic groups living in a single area to be referred to by a common name, and this would indeed appear to be the case for "Matlatzinca." The Matlatzinca language, as discussed above, is an Oto-Pamean language which probably has a time depth of millenia in the area of the Toluca Valley (see Quezada 1972); hence it would be very unlikely for Matlatzinca speakers to have been migrating southward from Aztlan with the Náhuatl populations. However, the Toluca Valley, often referred to as "Matlatzinco," was multilingual in the sixteenth century with a considerable Náhuatl population (Quezada 1972:Map 3). Piña Chán (1975:544f), citing Chimalpahin, thus interprets the Matlatzinca group listed among the Aztlan migrants as referring to Náhuatl speakers from the north who settled in the Toluca Valley among the Matlatzinca-speaking local population. This interpretation would then account for the anomaly of the presence of a non-Náhuatl group among the otherwise Náhuatl-speaking ethnic groups of the Aztlan account (all of these groups, with the exception of the Michoaque in Sahagún's list, spoke Náhuatl in the sixteenth century). Carrasco (1950:248) is either unaware of Chimalpahin's interpretation, or does not agree; he accepts the presence of "elementos no-naua como los matlatzinca" among the Aztlan migrants. Before approaching the problem of

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the chronology of these groups, the anomalous presence of "Chichimec" as an Aztlan group must be addressed; other problems and modifications of Table 2 are discussed in the notes.

The Chichimec Anomaly

As noted above, "Chichimec" is a very broad classificatory term which does not refer to any specific ethnic or linguistic group; in fact the Nāhuatl groups of the Aztlan theme are often referred to collectively as Chichimecs (Chimalpahin 1965:65f--see above; Ixtlilxochitl 1975, I:306f; Sahagún 1950-69, bk.10:197). For this reason, the presence of "Chichimeca" as one of the several specific Nāhuatl ethnic groups in seven of the twelve sources (Table 2) represents an anomaly. I believe that this problem may be resolved in three distinct fashions.

(1) "Chichimeca" in sources 6, 7, and 9 (Torquemada B, Chimalpahin B, and the Códice Aubin) refers to Acolhua; this is indicated in Table 2. Davies (1980:114-119) marshalls considerable evidence to show that Acolhua and Chichimec are synonymous in many sources, and refer in these contexts to early, pre-Nāhuatl Chichimec immigrants to the Acolhua area (i.e. the eastern shore of Lake Texcoco). Xolotl was the most famous (though perhaps mythological) personage of these Acolhua/Chichimecs, who spoke Otomí or some other Oto-Mangueyan language (Davies 1980:114-119). If "Chichimec" was used to refer to some specific Basin of Mexico ethnic group (beyond the general statement that all of these groups were Chichimecs), Acolhua is the most likely; the Acolhua leaders were called "Chichimecatl tecuhtli" (Ixtlilxochitl 1975, I:427ff), and Davies (1980:115-117) provides other examples in support of such an assignment. Given this association of

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Chichimec and Acolhua in the case of the pre-Náhuatl inhabitants of the Texcoco region and considering the importance of locality in ethnic group names, it would not be surprising then for "Chichimec" to be utilized in the Aztlan theme to refer to later Náhuatl migrants to that area as well. This interpretation is strengthened by the fact that with the possible exception of the two pictorial codices, sources 6, 7 and 9 are the only treatments of the Aztlan theme that fail to mention the Acolhua as such. Switching Chichimec to Acolhua in this case brings these sources in line with the other treatments of the Aztlan theme, accords with Davies' analysis of the Chichimec/Acolhua relationship, and reduces the anomaly of "Chichimec" among the specific Náhuatl groups.

(2) "Chichimeca" in sources 3 and 5 (Sahagún A and Torquemada A) refers to migrating peoples, probably not Náhuatl speaking, who preceded the Náhuatl groups of the Aztlan theme proper. In these two sources (which both include the Acolhua), Chichimec is listed as the first migrating group (although Torquemada's ordering is not necessarily significant). In Sahagún's account, the Chichimec leave Chicomoztoc, followed by the Michoaque, or Tarascans, who "traveled there to the west, where they dwell today" (Sahagún 1950-69, bk. 10:195). After these two groups departed, "then the Nahua, the Tepaneca departed" (p. 195), implying that the previous migrants had not been Náhuatl speaking.

(3) "Chichimeca" in sources 11 and 12 (Códice Azcatitlan and Tira de la Peregrinación) is one of two possible readings of the bow glyph which identifies group number 3 in these pictorial codices; I prefer to interpret this glyph as "Tlahuica." The glyph is commonly used in pictorial manuscripts to identify individual persons (holding bows) as Chichimecs (e.g. Códice Xolotl 1951); outside of this context, however, representations of the bow

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glyph alone are rare in central Mexican pictorial sources. In the Códice Xolotl (1951), four such isolated bows occur, compared with scores of Chichimec personages holding bows. In one such instance of an isolated bow (Códice Xolotl 1951:Plate 8, section A-2), the reference is to the "Chichimec" dynasty of Acolhuacan (Dibble 1951:100). Twice, the bow as a weapon signals battles or wars between groups (Códice Xolotl 1951:Plate 3, section A-4; Plate 7, section D-2, see Dibble 1951:95). The fourth isolated bow glyph (Códice Xolotl 1951:Plate 2, section C-2) is interpreted by Dibble (1951:39f) as a reference to Chichimecs, but the meaning actually relates to hunting of wild game and not to Chichimecs per se. The bow is attached to a square enclosure representing a corral which presumably held wild game caught by various Chichimec chiefs (i.e. individuals holding their own bows) for tribute payment to Xolotl, the Chichimec/Acolhua king. Ixtlilxochitl describes this scene as follows:

> a todos los dio tierras Xolotl su señor, en donde poblaron, y les mando hiciera cada uno de estos un cercado de caza para el tributo y reconocimiento que la habían de dar (Ixtlilxochitl 1975, I:297; emphasis added).

Thus the bow glyph here refers to the fact that the corral was for wild or hunted game; it was not necessarily a "Chichimec" corral.

In summary, it may be noted that the bow glyph refers quite often to Chichimecs, but only when an individual is portrayed holding the bow; when the glyph is used otherwise (at least in the Códice Xolotl), it more often than not refers to some other concept. I take this to imply that if the scribe who painted the Códice Azcatitlan and the Tira de la Peregrinación intended to portray Chichimecs as the third migrant group, he would have pictured a person (probably dressed in skins, another symbol of Chichimecs) holding a bow. This is not the case, and Chichimecs do not belong in the Aztlan lists, so the written label in the Códice Azcatitlan is almost

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certainly incorrect in its identification of glyph three as Chichimec.

I interpret the bow glyph to mean Tlahuica, based on one of the three contrasting etymologies of that term. Simeon (1977) gives two spellings of Tlahuica: tlalhuican; tlalhuicatl (p. 599) and tlahuican; tlahuicatl (p. 693). Neither is presented as preferable to the other, and many native historical accounts use the two spellings interchangeably (e.g. Durán 1967; Ixtlilxochitl 1975), although some authors utilize the former version exclusively (e.g. Sahagún 1950-69, bk. 10; Torquemada 1969). The spelling with two l's suggests an etymology involving tlalli (land; see the Códice Ramirez 1944:21, "gente de hacía la tierra"), while the alternate version points to either tlauitl (red ochre; suggested by Clavigero 1964:63) or to tlauitolli (bow, see Anonymous 1944:8) as the root of Tlahuica. The latter is to be favored because it yields a straightforward phonetic reading of the bow glyph in sources 11 and 12. Similar phonetic use of the bow glyph is seen in the Humboldt Codex, fragment 6, in which the name of Antonio Pimentel Tlahuilotzin is signified by a bow (Cline 1968:Figure 6). This phonetic reading of the bow glyph in sources 11 and 12 is certainly the most likely interpretation, since most if not all of the other seven glyphs in these sources are also phonetic representations.

Most authorities interpret the bow glyph on the Tira de la Peregrinación as Tlahuica (see Corona y Nuñez 1964:8; Anonymous 1944:14; Davies 1980: 178), although Orozco y Berra (1960, III:64; and 1864:91f) and Nicholson (1973:21) read the glyph as Chichimec, in line with the written gloss of the same glyph in the Códice Azcatitlan. It is perhaps ironic that Nicholson's use of an idiographic reading instead of the more likely phonetic reading is contained in an article on phoneticism in central Mexican writing. Barlow (1976a:69) refuses to commit himself, speaking of "people of the bow and

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arrow--Chichimeca or Tlalhuica."

The revisions proposed above under categories 1 and 3 eliminate "Chichimec" as a member of the Aztlan Nāhuatl groups, substituting either Acolhua (sources 6, 7, and 9) or Tlahuica (sources 11 and 12) in its place. The remaining t. references to Chichimec in the migration lists (sources 3 and 5) probably refer to non-Nāhuatl Chichimec groups who migrated before the Nāhuatl groups of the Aztlan theme. These changes produce a more consistent and logical list of migrant groups which may now be analyzed for its chronological implications.

Chronology of the Aztlan Migrations: Introduction

The migrant groups in the Aztlan theme are classified in Table 2 in accordance with a general chronological trend evident in those sources explicitly concerned with the order of the migration (sources 1-4). As discussed above, Sahagún A's Chichimecs and Michoaques are probably non-Nāhuatl migrants preceding the Nāhuatl speaking Aztlan groups; these belong to the "Chichimec" category which has temporal priority. All sources which specifically include the Mexica together with the other Aztlan groups (sources 1, 3, 4, 6) agree that they were the <u>last</u> of the migrants, while the remaining sources either imply or state elsewhere that the Mexica followed the other Aztlan groups. The remaining Aztlan groups may then be bracketed temporally between the non-Nāhuatl Chichimecs and the Mexica.

This basic chronological scheme for the Chichimec migration--non-Nāhuatl Chichimecs followed by the Nāhuatl Aztlan groups, and then the Mexica--is further supported by five sources not listed in Table 2. Motolinía (1979:204), Mendieta (1971:147), the Origen de los Mexicanos (1941:258), the Relación de la Genealogía (1941:240-247), and the Histoyre du Mechique (1905:

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8-19) all list the following as the major migrant groups to settle in central Mexico:

1. Chichimeca
2. Culhua
3. Mexica

The term "Culhua," like the terms Chichimec and Toltec, has a variety of connocations in the central Mexican native histories. First, it may refer simply to the inhabitants of Culhuacan in the southern Basin of Mexico. Second, the term often signifies the prestige of the Toltec heritage, based on Culhuacan's role, first as partner or co-capital with Tollan (Chimalpahin 1958:14), and later as Tollan's successor after the fall of the main Toltec capital (see Davies 1977:297-345). Third, the term may refer to civilized, Náhuatl speaking peoples of central Mexico, synonymous with the general sense of the term "Toltec" and opposed to the general "non-Náhuatl savage" sense of the term "Chichimec." In the five sources above listing Chichimec-Culhua-Mexica, it is this third definition of Culhua which is employed (although Mendieta confuses Colhua and Acolhua in the passage cited). The Culhua are described by Motolinía (1979:2-4) as civilized agricultural Náhuatl speaking peoples who migrated to central Mexico after the non-Náhuatl barbarous Chichimecs. This conception fits the Aztlan groups, an identification which is strengthened by Chimalpahin's name for the Aztlan migrants as "chichimecas teoculhuacas" (1965:66; Chichimec here is used in its more general connotation of migrant people from the north, as opposed to Motolinía's explicit definition of Chichimecs as non-Náhuatl nonagricultural savages). Thus Motolinía, Mendieta, the Origen de los Mexicanos, the Relación de la Genealogía, and the Histoyre du Mechique all provide the same basic chronological structure as do the 13 sources that deal explicitly with the Aztlan theme.

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Using the orders given in sources 1 to 4, the pre-Mexica Aztlan groups may be divided into an early contingent who settled in the Basin of Mexico, and a later contingent who settled in the surrounding valleys (see Table 2). This distinction is quite consistent among sources 1 to 4, there being only a single exception (Huexotzinca in source 4) to the principle that all Basin of Mexico groups precede all surrounding valley groups. Among the other sources, whose orderings of the groups are not explicitly said to be temporal orderings, two (nos. 8 and 10) follow this principle precisely, two (nos. 5 and 13) follow it generally, while the remaining five present ambiguous orderings with respect to the geographical division. Based solely upon the data presented in Table 2, then, the order of arrival of the Nāhuatl groups of the Aztlan theme is:

1. Basin of Mexico groups
2. Surrounding valley groups
3. Mexica

The attempt is not made here to go beyond this three-fold chronological division of the Nāhuatl migrant groups from Aztlan. Finer distinctions (did the Chalca precede the Tepaneca?) are far less likely to be historically valid, but more importantly, the geopolitical significance of such finer distinctions is probably less than that of the threefold classification (see below). The temporal ordering of the three divisions as derived from the Aztlan migration sources of Table 2 is completely relative in nature; these sources do not provide specific native dates for the arrival of the migrant groups in central Mexico (with the partial exception of the Mexica). Many local historical accounts, however, do give specific native dates for the arrival of Nāhuatl migrants in various areas; these sources are considered in the following section.

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Dating the Arrival of the Migrant Groups

The local native histories which give specific dates for the arrival of Nāhuatl migrants are in large part separate from the fifteen sources that list the Aztlan groups (Table 2). In those cases where a single source provides both kinds of information (Chimalpahin, Sahagún, the Anales de Tlatelolco), they are presented separately, and thus probably derive from different original native accounts. In the discussion which follows, individual calendar dates for the arrival of various migrant groups must be treated with caution. Problems and methodological issues in the interpretation of central Mexican native historical chronology are discussed at length elsewhere (Nicholson 1971, 1978; Davies 1973b, 1977, 1980); here I will only mention two of the primary obstacles to chronological studies. First, the cyclical nature of the 52-year calendar round in the absence of any continuous calendar comparable to the Mayan "long count," makes for a situation in which native dates (e.g. "2 Tochtli") may be correlated with a number of different Christian years. The appropriate 52-year cycle for a given native date, therefore, can only be determined in one of two ways. First, if it is part of a "continuous year-count annal" (Nicholson 1971) which is unbroken from some known date, such as Cortés' arrival in central Mexico, then the calculation can be figured directly by simply counting back from the known date. Second, when the date is not part of such an unbroken year-count (i.e. in the majority of situations), the appropriate 52-year cycle can only be determined through comparative analysis. The second major obstacle to central Mexican native chronological studies concerns the existence of several separate 52-year calendars in simultaneous use in various city-states

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(see Davies 1973b:193-210, 1980:34ff, 235ff for extensive documentation of this). The most prevalent calendar was the "Tenochca year-count," in which 1 Acatl corresponds to 1519, but at least 4 other counts were in use (for example, the Culhua count in which 1 Acatl = 1539). This situation obviously presents dangers when dates from separate histories are compared.

Both of these problems--52-year repeatability and the existence of different counts--are greatly compounded by the fact that much of our knowledge of native history derives from sixteenth- and seventeenth-century sources who based their accounts on now-lost native codices and oral traditions. In addition to expected contradictions between sources, there are many examples of contradictions and inconsistencies in dating within a a given source (e.g. Chimalpahin 1965; Ixtlilxochtl 1975); these derive in large part from the failure of the Colonial period chroniclers to deal adequately with the above two sources of indeterminacy in the native accounts. Davies (1980:258ff) has shown, for example, that Chimalpahin was not aware of differences between the various year-counts, and as a result many of his Christian year-equivalents are incorrect.

Because of these and other problems, there is a consensus among contemporary students that the reliability or historicity of native calendrical dates drops off with time, and the early- to mid-fourteenth century is generally given as the limit to accurate, reliable dates (Nicholson 1971:47,60; Davies 1980:183). Beyond this point, conservative scholars (e.g. Nicholson 1971) often deny the validity of chronological analysis (although see Nicholson 1978 for a more liberal view), while optimists such as Davies (1977, 1980) pursue chronological studies for earlier times, acknowledging the decreased reliability of dates from this

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era.

The position taken here is that if a number of native dates for a single event converge closely, then some reliability may be granted for the dating of the event; the greater the number of dates, the greater the confidence that may be placed in the dating. No attempt is made to date events to the precise year. Given the uncertainties of pre-fourteenth century chronology, a convergence of dates within a few decades of each other is considered significant. While the dates that exist for the arrival of the Aztlan migrants are discussed separately for each group, analysis of the chronology and its implications will proceed on the level of the three categories described in the previous section.

The hypothesis of investigation in this section is that, if native dates for each of the three main Nāhuatl migrant groups (Basin of Mexico, Surrounding Valleys, and Mexica) cluster in time, and if the ordering of these clusters replicates the order derived from Table 2 above, then the dates may be accepted as generally valid. It should be emphasized again that in almost all cases, the dates utilized in this section are derived from sources independent of those listed in Table 2. Unless otherwise stated, native dates are assumed to correspond to the Tenochca year-count.

Xochimilca

A - 1182.--The Anales de Cuauhtitlan (1975:16) mention hostilities between the Xochimilca and Culhua in 2 Tochtli (=1130), implying that the Xochimilca had arrived in the sourthern Basin of Mexico by that date. All of the twelfth and thirteenth century dates in the Anales de Cuauhtitlan have been advanced one calendric cycle (52 years) for reasons discussed below with the Mexica dates; this yields a date of A.D. 1182.

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B - ca. 1240.--Ixtlilxochitl (1975,I:309) states that the Xochimilca arrived and settled Xochimilco several years prior to the death of the Acolhua ruler Tlotzin. For reasons discussed in the Mexica section below, I estimate Tlotzin to have lived ca. 1200 to 1250, yielding ca. 1240 for the approximate date of arrival of the Xochimilca. Doubts have been expressed as to the historicity of Tlotzin (e.g. Davies 1980:29), making this date somewhat tentative, however.

Nicholson (1978:303) cites Durán as placing the Xochimilca arrival at ca. A.D. 902. Durán (1967, II:22) states that the Mexica had possessed their land for 301 years (i.e. from ca. 1220), and that the other Náhuatl groups had been in place in the Basin of Mexico for 602 years (which yields ca. 919). Durán is not to be trusted here, however. His work is notable for its lack of attention to native dates and chronological accuracy. In his later discussion of the Mexica arrival (p. 28), he gives one of his rare precise dates (A.D. 1193); this date agrees with other sources (see Mexica discussion below), indicating that his 301 year figure is only an approximation. Therefore the related 602 year figure for the arrival of the other groups, of which the Xochimilca were first in Durán's account, is almost certainly much less accurate.

Chalca

A - 1195.--Chimalpahin (1958, 1965) and the Anales de Cuauhtitlan (1975) speak of many different ethnic groups migrating into and out of the Chalco area in the thirteenth and fourteenth centuries; Davies (1980: 263-276) attempts to sort these groups out and provide a chronology for their migrations. The group most likely to correspond to the Náhuatl speaking Chalca of the Aztlan accounts is not given a name, however. The

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Anales de Cuauhtitlan (1975:16) state that during the reign of "Acatl," or 3 Acatl (=1131) to 1 Acatl (=1155), "llegaron todos los que hoy se dicen Chalcas, etc." Adding one 52-year cycle to these dates gives a reign of 1183 to 1207, of which 1195 is the midpoint.

B - 1261.--Of the various named groups migrating into Chalco (Acxotecas, Tlaillotlacas, Totolimpanecas, Tecuanipas, Poyauhtecas, Teotlixcas, etc.), one--the Totolimpaneca--is said to come from Chicomoztoc. However, this group, the "chichimecas totolimpanecas," left Chicomoztoc in 6 Tecpatl (=1160), nearly a century after the Mexica are said to have departed (Chimalpahin 1965:128; 1958:16,40). Chimalpahin (1965:129) reports that they arrived in Chalco in 9 Calli, or 1241; to this date 20 years must be added to correct for Chimalpahin's shift in calendars (see Davies 1980:258-270). The resulting arrival date of 1261, however, is not really germane to this discussion, since this post-Mexica group cannot be equated with the pre-Mexica Chalca of the Aztlan theme. Davies (1980:271) incorrectly asserts that "the Memorial Breve [Chimalpahin 1958] states that they [the Totolimpaneca] left Aztlan before the Mexicas."

Tepanecs

The Tepanec area, on the western shore of Lake Texcoco, was multilingual in the sixteenth century, with Nāhuatl, Matlatzinca, Otomí, and other Oto-Pamean languages all spoken (Carrasco 1950:32f). While Carrasco (1950) emphasizes links between the Tepanecs and various Oto-Pamean cultures (especially Matlatzinca), Sahagún (1950-69, bk. 10:195) explicitly calls the Tepanecs Nāhuatl speakers ("in noatlaca, in tepaneca").

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Davies (1980:134-143) discusses the evidence for both Nāhuatl and Oto-Pamean languages in the Tepanec area, and concludes that a process of Nahuatization had taken place, though he states that "no information survives concerning when the Tepanecs became Nahuatlized" (1980:143). I would suggest that Nāhuatl was brought to this area by the Tepanec migrants of the Aztlan accounts, who arrived in the period A.D. 1150 to 1225.

A - 1152.--This is Barlow's (1948b:table) interpretation of the date of the foundation of the Tepanec dynasty given in the Anales de Tlatelolco (1948).

B - 1184.--Ixtlilxochitl (1975,I:296) states that Azcapotzalco, the Tepanec capital, was founded by Izputzal in 10 Calli (=1020 or 1021) with the permission of Xolotl, early in the latter's reign. While there are some doubts about the historicity of Xolotl, who is said to have lived 112 years (see Davies 1980:42ff on this and other contradictions in the accounts of Xolotl's life), it is nevertheless possible to utilize the Xolotl accounts of Ixtlilxochitl for comparative chronological analysis. Xolotl is said to have arrived in the Basin of Mexico in 5 Tecpatl, several years after the fall of Tula (Ixtlilxochitl 1975,I:293). Given Davies' (1977) date of 1175 for Tula's end, he equates Xolotl's 5 Tecpatl arrival date with 1179 (1980:43). The date 10 Calli, dating the foundation of Azcapotzalco early in Xolotl's reign, comes 5 years after 5 Tecpatl, that is, 1184.

C - ca. 1210.--Chimalpahin (1958:9) has Chichimecs settling Azcapotzalco in 10 Acatl, which he equates with A.D. 995. Although

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Nicholson (1978:296) gives this date as a possible origin date for Azcapotzalco, it is almost certainly incorrect; as Davies (1980:258-268) and others have shown, there are many problems with Chimalpahin's dates, and few of his Christian year equivalents can be taken at face value. However, the 10 Acatl in question may be put into perspective by comparison with Chimalpahin's (1958:7) date for the arrival of Xolotl in 12 Tochtli (equated with 958), 37 years prior to the Azcapotzalco date. This comparison allows 3 possible interpretations for 10 Acatl. First, if 37 years are simply added to Davies' date for the arrival of Xolotl (1179), a date of 1216 is obtained. Second, if Davies' equation of 5 Tecpatl=1179 for Xolotl is utilized, then counting years to 10 Acatl produces a date of 1210. Third, and least likely, if 10 Acatl is figured in the Tenochca year-count, then the corresponding date is 1203. As these alternative corrections center around A.D. 1210, this is given in Table 3 for the event in question.

D - 1226.--Ixtlilxochitl (1975,II:17) describes the arrival of three groups--Acolhua, Otomí, and Tepanec--in the Basin of Mexico 47 years after Xolotl's arrival, which is taken here as happening in 1179. Carrasco (1950:249-251) associates these three groups with the Toltec dispersal, and thus by implication with the Aztlan migrants. Ixtlilxochitl states that each spoke a distinctive language, however; this indicates that the Acolhua and Tepanecs mentioned here could not both be Nāhuatl speaking groups. Martínez Marín (1954/55) calls this episode the "migración Acolhua," and dates it to 1 Tecpatl in the Tenochca count, which is either 1220 or 1272 (p.378).

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Acolhua

At least two major influxes of Chichimec populations into the Acolhua area may be discerned in the native historical sources: a non-Náhuatl group arriving among the early Chichimec migrations, and later Náhuatl speakers who then settled among these earlier populations. Davies (1980:94-125) synthesizes available information on the first of these groups, which included the Chichimecs of Xolotl (see Ixtlilxochitl 1975; Códice Xolotl 1951) and concludes that the "Acolhuas [were] part of the original movement of Otomí-speakers, accompanied by Pame and other Teochichimecs" (Davies 1980:118). The ruling lineage of Texcoco was descended from these early Acolhua. The rulers did not speak Náhuatl until the emperor Techotlalatzin, who was educated by a Náhuatl speaking noblewoman from Culhuacan, decreed that Náhuatl was to be the official language of Acolhuacan (Chimalpahin 1965:74; Pomar 1975:4; Ixtlilxochitl 1975,II:34). This relatively late Nahuatization of the Acolhua (Davies 1980:59 gives 1377-1409 as the dates for Techotlalatzin) was facilitated by the fact that many Náhuatl speakers already lived in the Acolhua area:

> Techotlalatzin . . . fue el primero que uso hablar la lengua náhuatl que ahora se llama mexicana, porque sus pasados nunca la usaron; y así mandó que todos los de la nación chichimeca [i.e. the original Acolhua] la hablasen, en especial todos los que tuviesen oficios y cargos de republica . . . lo cual les fue facil, porque ya en esta sazón estaban muy interpolados con los de la nación tulteca [i.e. Náhuatl speakers] (Ixtlilxochitl 1975,II:34: emphasis added).

Davies (1980:129-131) suggests that many of these pre-Techotlalatzin Náhuatl speakers migrated to Acolhuacan during the reign of his predecessor, Quinatzin II (1330-1374; see Davies 1980:59). I would like to add that the first Náhuatl speakers to settle in this area were probably the "Acolhua" of the Aztlan migration theme who arrived over a century earlier. There is

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a problem in the interpretation of the following dates, however. It is not possible to fully distinguish references to the two series of Acolhua migrants; both are called Acolhua and both are referred to as Chichimecs.

A - 1149.--The Relación de Chicoloapan (1905:80) states that the town was founded by Chichimecs from Chicomoztoc in 1149. These founders are said to have spoken a "Chichimec" language distinct from both Náhuatl and Otomí. This account appears to combine elements of the early and late Acolhua migrations; if the reference is to the non-Náhuatl early Acolhua, then the mention of Chicomoztoc is incorrect, and conversely if the reference is to the later Náhuatl speaking Acolhua from Chicomoztoc, then the language is incorrect.

B - 1158.--This date refers to the founding of Huexotla dynasty as listed in Sahagún. He (1950-69, bk.8:13) lists Mazatzintecuhtli and Tochintecuhtli as the first two rulers of that town, reigning for 78 and 38 years respectively. If Davies' (1980:58) date for the death of the latter ruler (i.e. A.D. 1274) is correct, then the beginning date for Mazatzintecuhtli is computed at 1158.

C - 1164.--The Relación de Coatepec (1905:42) contains an account identical to that in the Chicoloapan relacion (date A); "Chichimec" speaking Chichimecs from Chicomoztoc settled the town in 1164.

D - 1197.--Sahagún (1950-69, bk.8:15) states that Chichimecs arrived in Acolhuacan 22 years after the fall of Tollan, dated by Davies (1977:410-414) to 1175. Since the Chichimecs of Xolotl are generally listed as arriving immediately after Tollan's fall, I take this reference

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to later Chichimecs to refer to the Acolhua of the Aztlan theme who settled the area some time after Xolotl's arrival.

E - 1226.--This is the same date that is listed as date D for the Tepanecs above. To reiterate, since Ixtlilxochitl (1975,II:17) states that the three arriving groups--Tepanecs, Acolhua and Otomí--spoke different languages, then both the Tepanecs and Acolhua of this account would not have spoken Náhuatl; hence this date probably applies to either the Tepanecs or the Acolhua of the Aztlan theme, but not to both.

F - 1259.--The Relación de Chimalhuacan (1905:66) states that the town was founded in 1259 by people from the province of Tula who spoke "chichimeca y mexicana."

Northern Basin of Mexico

The Relaciones Geográficas of two towns in the northern Basin of Mexico mention their dates of foundation. It is not clear which of the Náhuatl groups of the Aztlan theme settled in the towns.

A - 1219.--The Relación de Hueypochtla (1905:26) states that the town was settled in 1219. Since the town's name, a Náhuatl toponym, is said to date to the initial settlement (p. 26), it may be inferred that those settlers were Náhuatl speakers.

B - ca. 1280. The Relación de Tezcatepec (1905:32), written in 1579, states that the town was settled approximately 300 years ago ("poco mas o menos").

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Tlaxcala

A - ca. 1220. Muñoz Camargo (1892:70) states that Chichimecs had been in possession of Tlaxcala and surrounding areas for 300 years prior to the Spanish conquest, giving a date of 1220. He elsewhere (1892:24) states that Chichimecs arrived in Tlaxcala 300 years ago ("puede haber trescientos años poco más o menos que vinieron"), but it is not clear whether this refers to 300 years prior to the Spanish conquest, or 300 years prior to the writing of Historia de Tlaxcala; the latter possibility would yield a date of ca. 1290.

B - 1224.--Muñoz Camargo (1892:19-68) and Torquemada (1969, I:256-270) describe the migration of the Tlaxcalteca from Aztlan, giving native calendrical dates without Christian year equivalents. The major events and their dates are listed in Table 3, along with the four most probable Christian year correlations (all using the Tenochca count). Orozco y Berra (1960,III:110) favors correlation A, giving 1384 for the battle of Tepeticpac. Nicholson (1978:313) favors correlation B, for two reasons. First, the length of time between the founding of Tlaxcala and the Spanish conquest in this correlation is said to fit Gibson's (1952:5) calculation of reign-lengths better than do correlations C and D. Second, Nicholson states that 1250 in correlation B is "in better conformity with Muñoz Camargo's round figure " [i.e. 1220, date A] (Nicholson 1978:313). However, the appropriate date to compare with Muñoz Camargo's estimate of Chichimec arrival in Tlaxcala is 5 Tecpatl, the arrival in Tlaxcala, and not 5 Tochtli, the departure from Aztlan. This comparison, then, actually favors correlation D (5 Tecpatl=1224), which is further supported by statements in the Historia Tolteca-Chichimeca (1947:111) and the Anales de

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TABLE 3

CHRONOLOGY OF TLAXCALTECA MIGRATION

	Event	Native Date	Alternative Correlations			
			A	B	C	D
1.	Departed from Chicomoztoc	5 tochtli	1302	1250	1198	1146
2.	Settled in Poyauhtlan	2 tecpatl	1312	1260	1208	1156
3.	Battle of Poyauhtlan	1 tochtli	1350	1298	1246	1194
4.	Arrived in Amecameca	2 calli	1377	1325	1273	1221
5.	Arrived in Tlaxcala area	5 tecpatl	1380	1328	1276	1224
6.	Battle of Tepeticpac	9 tecpatl	1384	1332	1280	1228

Cuauhtitlan (1975:17) that the battle of Tepeticpac took place in 9 Tecpatl (=1228). On the other hand, the addition of one cycle to the Anales de Cuauhtitlan (which I am doing for all of its dates--see the Mexica section below) favors correlation C, which is followed by Chavero (1892:27) in his notes on Muñoz Camargo. Overall, I favor correlation D, although C cannot be ruled out.

Northern Puebla

The Relaciones Geográficas of a number of towns in northern Puebla state that the towns were settled by Chichimecs in the thirteenth century. While these towns cannot be specifically matched with any of the named Náhuatl groups of the Aztlan theme, the Chichimecs in question are most likely part of these Aztlan migrations. Three of the accounts (A, D, and E) state that the Chichimecs were from Colhuacan, closely linked to Aztlan and Chicomoztoc in the Aztlan migration theme. Muñoz Camargo (1892:45) mentions that some of the Chichimecs who had accompanied the Tlaxcalteca migrated further eastward as far as the Gulf Coast; this may be a reference to the Chichimec settlers of the northern Puebla towns. The relevant dates are all from various parts of the Relación de Xonotlan y Tetellan (1905).

A - 1200.--Xonotla (p. 131).

B - 1215.--San Esteban (p. 152).

C - 1219.--Tetela (p. 145).

D - 1219.--Zuzumba (p. 163).

E - 1241.--Capulapan (p. 158).

F - 1281.--Tututla (p. 168).

Nicholson says of these dates:

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> Most of these specifications of years are so precise that it seems likely they were derived from authentic dated local histories. The "Chichimeca" who overran much of Totonacapan appear to have been closely connected with those who similarly moved into the Basins of Mexico and Puebla no later than [the] wake of Tollan's fall (Nicholson 1978:311).

Mexica

A - 1211.--Chimalpahin (1965:69) places the arrival of the Mexica in Chapultepec in 11 Acatl, which he converts to A.D. 1191. Adding 20 years to this date to correct for Chimalpahin's use of the Culhua year count (Davies 1980:258ff) yields a date of 1211.

B - ca. 1220.--As mentioned above in the discussion of the Xochimilca arrival, Durán (1967,II:22) gives a vague figure of 300 years for the period of Mexica settlement prior to the Spanish conquest. This date may or may not refer to the arrival of the Mexica in Chapultepec--it could refer to the founding of Tenochtitlan or some other event. A more precise date is given elsewhere by Durán (see date G below), throwing doubt on the validity and relevance of the 300 year figure.

C - 1246.--Ixtlilxochitl twice mentions the arrival of the Mexica in Chapultepec in a year 1 Tochtli (1975,I:409,427), which he equates in the first instance with 1204 and in the second with 1140. In both places, however, the Mexica arrival is said to come in the same year as the death of Tlotzin, the third "chichimecatecuhtli" or Chichimec ruler of the Acolhua. Although Ixtlilxochitl gives at least five different Christian year dates for Tlotzin's death (see O'Gorman 1975:101), the most likely correlation for the 1 Tochtli date is 1246. While doubts have been voiced as to the historicity of Tlotzin (Davies 1980:45ff), he is listed as the father of Tochintecuhtli (Ixtlilxochitl 1975,I:424,533) and the father-in-law

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of Huetzin (p. 429), two figures of generally accepted historicity. Davies (1980:45-69) figures the reign of Huetzin to 1253-1274, and also fixes the death of Tochintecuhtli around the year 1274 (see especially pp. 58-61). This would put Tlotzin's life in the first half of the thirteenth century, with 1246 (=1 Tecpatl) a reasonable date for his death. Accepting Ixtlilxochitl's two statements that this event coincided with the arrival of the Mexica gives 1246 for this latter event as well.

D - 1257.--The Anales de Tlatelolco (1948:34) place the arrival of the Mexica in Chapultepec four years after 8 Calli (i.e. 12 Calli). Barlow (1948b:xvi) lists 1253 as the date of this arrival, but he is incorrectly using 8 Calli here instead of the correct date of 12 Calli. The proper date here for the Mexica arrival, then, is 12 Calli, which corresponds to 1257.

E - 1246.--The Mexica arrival is given in the Anales de Cuauhtitlan (1975:17) as 1 Tochtli, equated to 1194. In order to bring this date into correspondence with dates C and D above, one cycle is added, yielding 1 Tochtli = 1246. This shift of one cycle in the twelfth- and thirteenth-century dates in the Anales de Cuauhtitlan, followed in all of my dates here, is advocated by Carrasco (1950:249), citing personal communication from Wigberto Jimenez-Moreno.

F - 1247.--Tezozomoc (1975:39) has the Mexica arrive in Chapultepec in time to celebrate a New Fire ceremony in 2 Acatl, which he equates with 1195. Following the same procedure utilized in the case of the Anales de Cuauhtitlan above, one cycle is added to this Christian-year equivalent to

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yield 1247.

G - 1245.--Durán (1967,II:28) gives 1193 specifically as the date of the Mexica arrival in Chapultepec. Although no native date is given for the event, Durán's information probably derives from the same source(s) used by Tezozomoc for this event (i.e. the Crónica X), and 1193 would correspond to 13 Calli. Adding one cycle to this gives the date of 1245.

Chronology of the Aztlan Migrations: Conclusions

The arrival dates of Nāhuatl migrants discussed above are presented graphically in Table 4, where the mean arrival date and one standard deviation are indicated for each group. The two Northern Basic of Mexico dates are treated separately, because it is not clear how they fit into the geopolitical scheme of central Mexico; although located in the physiographic Basin of Mexico, Hueypochtla and Tezcatepec are not necessarily aligned with any of the named Nāhuatl groups and may in fact pertain more to the Surrounding Valleys groups. Dates in parentheses in Table 4 were not included in the statistical calculations. Most of these are not acceptable dates (see preceding section for discussion), with the exception of Northern Puebla date F and Mexica date A, which are omitted simply due to their extreme values which would bias the mean and standard deviation calculations.

It can readily be seen that the order of the mean arrival dates for the three groups--Basin of Mexico, 1195; Surrounding Valleys, 1220; Mexica, 1248--replicates the order for these groups derived from Table 2 above. The independence of the data in Table 2 and the dates in Table 4 should perhaps be emphasized again. The accounts of the Aztlan migration theme presented

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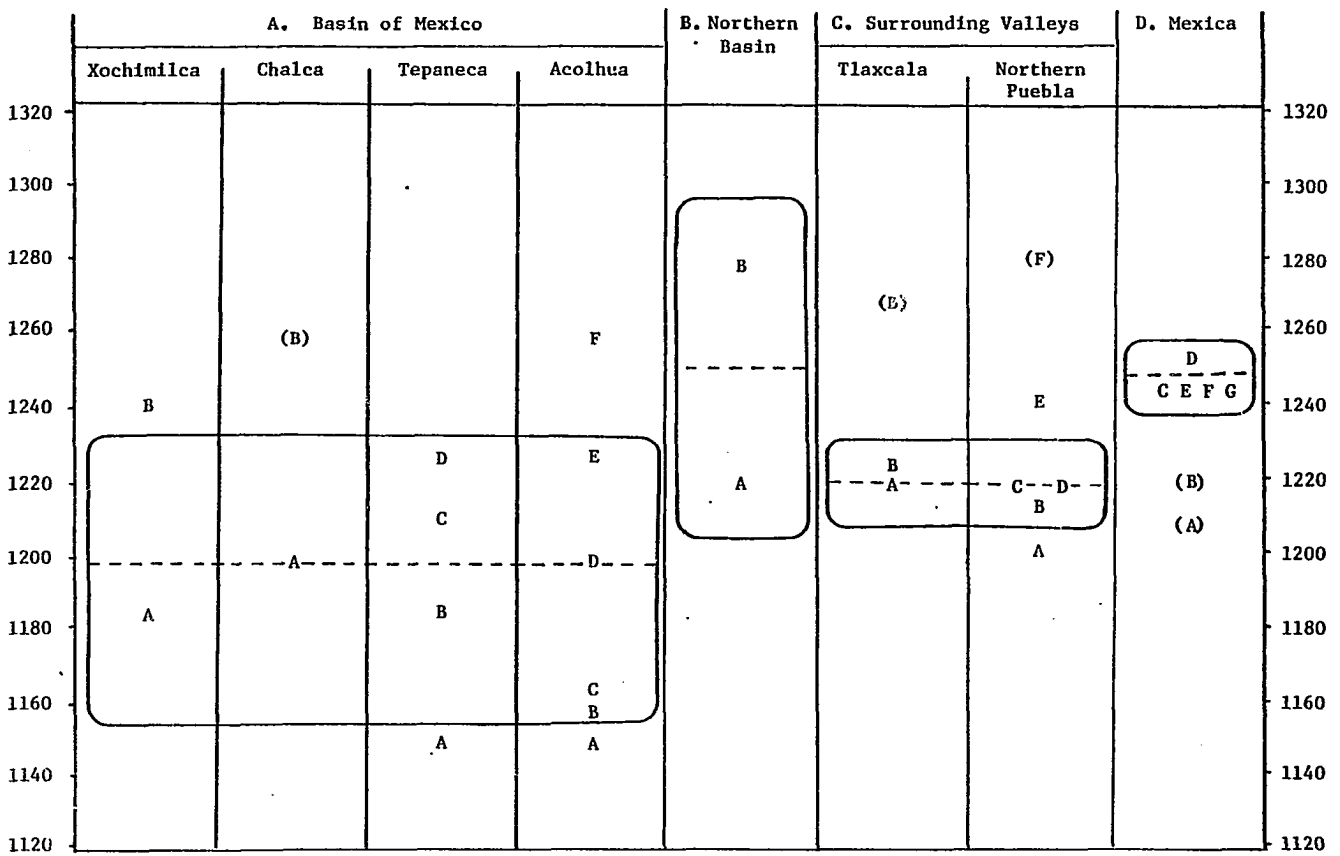
TABLE 4

ARRIVAL DATES FOR THE NAHUATL GROUPS[a]



[a]Dashed lines indicate the mean arrival date for each group, and the enclosed areas indicate the extent of one standard deviation. Dates in parentheses are questionable and are not used in the calculation of means and standard deviations (see text for explanation).

in Table 2 derive from general treatments of central Mexican native history, while the specific dates of Table 4 derive primarily from local historical traditions, either directly (as in the case of the Relaciones Geográficas) or indirectly through the compilations of early colonial authors (Ixtlilxochitl, Muñoz Camargo, etc.).

The convergence of these two data sets suggests that the inferred ordering has historical validity. The standard deviations of the group arrival dates increases from 5.2 (Mexica) to 11.2 (Surrounding Valleys) to 35.2 years (Basin of Mexico), indicating less agreement on the earliest arrival dates than on the later dates; this numerical finding supports the interpretations of Nicholson (1971), Davies (1977, 1980), and others that historical accuracy or reliability drops off with time in the native historical sources.

With the exception of Tepanec date A and Acolhua dates A, B, and C, all of the arrival dates in Table 4 fall after A.D. 1175, the probable date for the fall of Tula (Davies 1977:410-414). This agrees with the general consensus among native historical sources that most of the Chichimec migrations occurred at or after Tula's destruction (see above). Since the perhaps mythical Xolotl is said to have arrived in the Basin of Mexico only four years after the fall of Tula (see Davies 1980:43), all of the dates with the same four exceptions post-date Xolotl's arrival as well. This supports my contention that the initial Chichimec migrants, who included Xolotl, were not Náhuatl speakers (see Davies 1980:94-125) while the later Chichimec migrants (i.e. the ethnic groups of the Aztlan theme) did speak Náhuatl. Although there is linguistic and ethnohistorical evidence that Náhuatl was one of the languages spoken at Tula (see above), there is no mention in the

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native historical sources of Nâhuatl in the Basin of Mexico prior to the arrival of the Aztlan migrants. This may imply that during the Early Postclassic or Toltec Period, Nâhuatl had only penetrated as far south as Tula, and that the language was first brought to the Basin of Mexico and Surrounding Valleys by the Aztlan migrants after the fall of Tula.

In sum, my reconstruction of the arrival order and relative dates for the Nâhuatl migrants from Aztlan/Chicomoztoc fits well with other available information on the linguistics, migrations, and political history of Postclassic central Mexico. Aztlan migrants settled in the Basin of Mexico somewhere around the year 1200, followed first by populations moving into the surrounding valleys, and finally by the Mexica, settling in Chapultepec in the mid-thirteenth century. On this basis, it is reasonable to infer that the Tlahuica, grouped with the Tlaxcalteca and other Surrounding Valley populations, arrived in Morelos early in the thirteenth century.

Nâhuatl Settlement of Morelos

According to Durân, the Tlahuica were not the first Nâhuatl settlers of Morelos; populations of the Xochimilca settled in parts of northeastern Morelos, including the following towns: Tepoztlan, Totolapan, Tlayacapan, Ocuituco, Tetela, Hueyapan, Tlamimilolpan, Xomiltepec, Tlacotepec, Zucualpan, and Temoac (Durân 1967,II:22). Although Durân says that Yacapichtlan was settled by the Tlahuica (1967,II:23), the Relación de Yacapichtlan (n.d.: 225) reports that, "dicen que los que poblaron a esta villa heran como está dicho de suchimillco." It is further stated that the Nâhuatl spoken in the Yacapichtlan area was "lengua de suchimillco," somewhat different from standard Texcoco/Tenochtitlan Nâhuatl. The Relación de Tetela y Hueyapan

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(pp. 283-285) says that these towns were subjects of Xochimilco before 1519, though nothing is said of their initial settlement by Nāhuatl speakers.

Of the four documentary sources in Table 2 that emphasize the order of arrival of the Aztlan migrants, three--the Crónica X, Chimalpahin A, and the Anales de Tlatelolco--mention the Tlahuica; in all of these, the Tlahuica are the first group to arrive once all of the Basin of Mexico groups have arrived. Sources of the Crónica X tradition (e.g. Durán 1967, II:23; Códice Ramirez 1944:22f; Acosta 1940:515) specifically state that the first four Nāhuatl groups--Xochimilca, Chalca, Tepanec, and Acolhua--had settled the entire Basin of Mexico when the Tlahuica arrived. The Tlahuica were then forced to continue migrating southward, out of the Basin of Mexico and into Morelos, in order to find land available for settlement; similarly, the Tlaxcalteca, the final pre-Mexica group in the Crónica X accounts, were also forced to pass beyond the Basin of Mexico in order to find a place to settle.

Durán (1967,II:23) relates that the Tlahuica took Cuauhnāhuac for their capital, and from there branched out to settle in Yauhtepec, Huaxtepec, Yacapichtlan, and Tlaquiltenango, "con todos los demás pueblos, villas, y estancias que llamamos Marquesado." This latter phrase is important (it is repeated in Chimalpahin 1965:75), for it means that the Tlahuica did not settle only in the area of these five towns, but rather populated virtually the entire territory included in the land granted to Cortés and called the "Marquesado." The towns reported by Durán as populated by Xochimilca and Tlahuica settlers are shown in Figure 2, along with the boundaries of the major polities (provinces) of Morelos in 1519 as reconstructed by Gerhard (1970) and myself (Chapter 3). Yacapichtlan

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Figure 2. Tlahuica and Xochimilca settlement of Morelos. Taken from Durán 1967, II:22-23.

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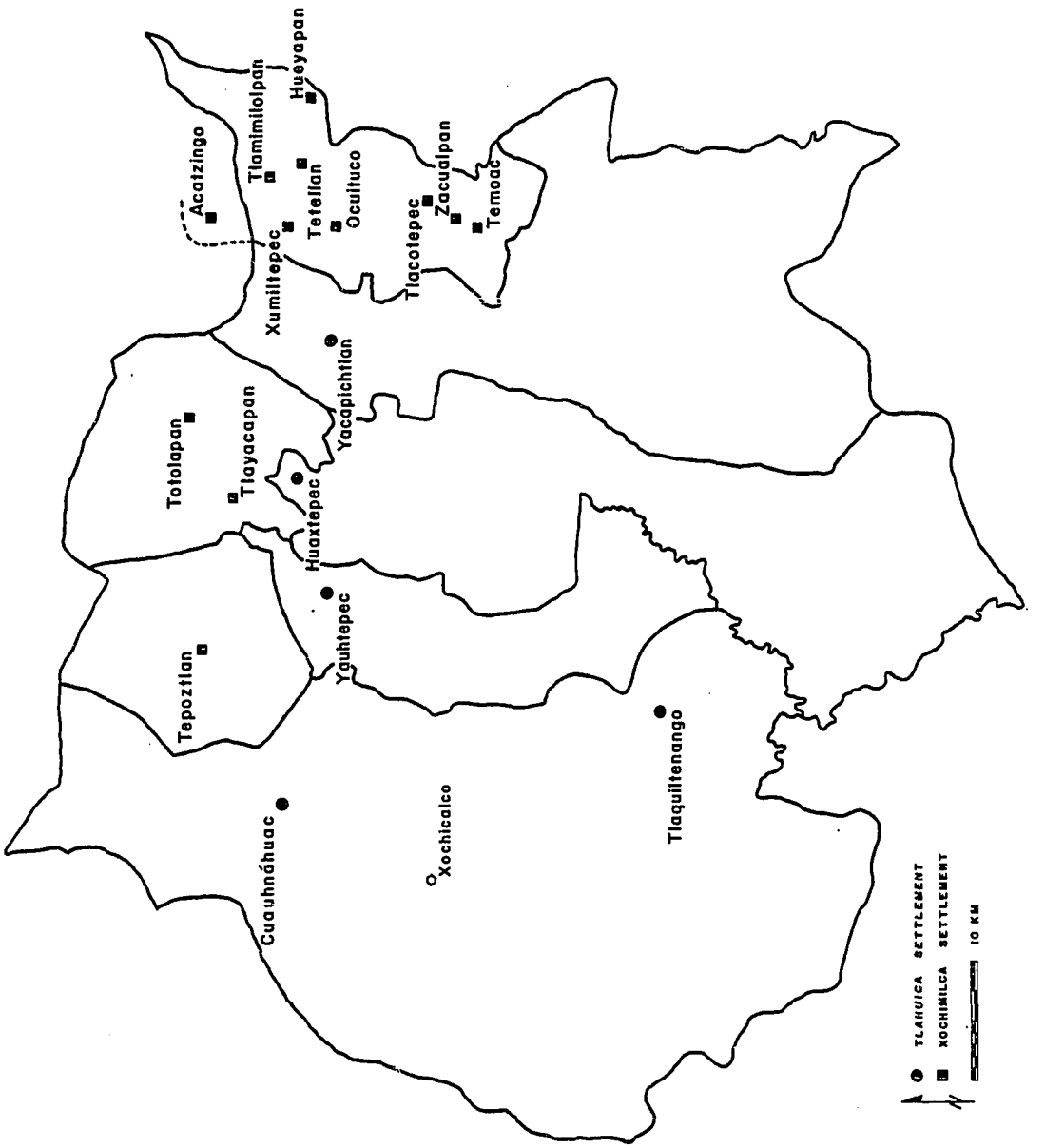

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is shown as a Tlahuica town, following Durán, in spite of its identification by other sources as a Xochimilca town (see above); perhaps it was settled by both ethnic groups successively. It may be observed in Figure 2 that the 11 Xochimilca towns include the capitals and comprise most of the territory of three of the conquest period provinces of Morelos--Tepoztlan, Totolapan, and Ocuituco. Durán's list of five Tlahuica towns includes the capitals of the remaining four provinces (Cuauhnáhuac, Yauhtepec, Huaxtepec, and Yacapichtlan). These patterns indicate that the early thirteenth century ethnic divisions of Morelos had political implications that lasted for three centuries, from initial Náhuatl settlement to the Spanish conquest.

In addition to the historical sources of the Aztlan migration theme, there are several mentions in other sources of Náhuatl settlement of other towns. The Relación de Totolapan (1905:8) says that the town was founded by Náhuatl speaking Chichimecs, while the Relación de Huaxtepec (1930:34) reports that the town of Chinameca was settled by Chichimecs without giving a language. Ixtlilxochitl (1975,I:281f,531; II:15) states that after the destruction of Tula, a number of Toltecs fled south and settled in Totolapan; this may be a reference to migrating Náhuatl speakers of the Aztlan theme, or it may simply refer to populations from Tula (probably Náhuatl speakers) with no necessary connection with the Tlahuica or Xochimilca.

Although the Códice Ramirez (1944:22) states that Morelos was unoccupied when the Tlahuica arrived ("una tierra muy espaciosa toda desocupada de gente"), this was almost certainly not the case. It is customary in central Mexican native historical accounts to call territory "empty" when a new group settles the area; Calnek (1973:426f) shows that

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this merely means that there were no large urban settlements or organized military opposition in the area. There are several historical indications that the settlement of Cuauhnáhuac was already in existence when the Tlahuica arrived. Durán (1967,II:23) says that the Tlahuica "took" ("tomando") Cuauhnáhuac as their capital, and that they then moved on to Yauhtepec, Huaxtepec, etc., to settle; he does not say that any of these towns were founded by the Tlahuica. The Anales de Cuauhtitlan (1975:63) mention an alliance among Tollan, Cuauhnáhuac, Huaxtepec, Cuahchinanco, and Cuahuacan, which both Nicholson (1978:318) and Carrasco (1950:283) attribute to the late Toltec period (i.e. pre-1175, and considerably prior to the Tlahuica arrival). Ixtlilxochitl (1975,I:272) describes a "Toltec palace" in Cuauhnáhuac which was in ruins in the sixteenth century; however, his description fits the site of Xochicalco (in the province of Cuauhnáhuac) better than it does any known ruin in the actual city of Cuauhnáhuac.

In conclusion, my analysis of central Mexican native historical treatments of Chichimec migrations from Aztlan/Chicomoztoc shows that Náhuatl speaking populations first settled in the Basin of Mexico around the year 1200, to be followed shortly by related groups who settled in the surrounding valleys of Puebla/Tlaxcala, Toluca, and Morelos. The specific Náhuatl group to settle most of Morelos was the Tlahuica, with populations of Xochimilca settling the northeastern part of Morelos. Given that the two dates for the arrival of the Tlaxcalteca are 1220 and 1224 (Table 4), and that the Tlahuica are said to precede the Tlaxcalteca in those accounts listing them both (Table 2), it may be suggested that the Tlahuica arrival date falls somewhere between 1200 and 1220. These Náhuatl

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speakers encountered indigenous Matlatzinca speakers in western Morelos, and Mixtec and/or Popoloca speakers in eastern Morelos. Unfortunately, the dynamics of interaction between these groups and the nature of the processes leading to the virtual extinction of the Oto-Mangueyan languages in Morelos are not known. The historically-derived dating of Nāhuatl settlement of Morelos (early thirteenth century) falls in the later portion of the linguistically derived range of A.D. 1000 to 1300 discussed in the first part of the chapter.

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Notes

[1]The documentary sources specifically stating that Nāhuatl was the sole or at least primary language spoken in Morelos are: Durán (1967, II: 23); Sahagún (1950-69, bk. 10:186); Ponce (1873, I:198,200); Relación de Totolapan (1905:8); Relación de Tetela y Hueyapan (1905:285); Relación de Tepoztlan (1905:240); Relación de Yacapichtlan (n.d.:225) and Relación de Huaxtepec (1930:36). Lastra and Horcasitas' (1980) discussions of the contemporary Nāhuatl of Morelos includes some observations on the sixteenth century language (e.g. p.234).

[2]Several unsupported hypotheses have been advanced concerning the language of Xochicalco. Weaver (1973:199), for example, states that Xochicalco was inhabited "perhaps by Mixtec-speaking people." She then asserts (p.202) that Caso's analysis (1967:166-186) provides evidence for Nahua influence at Xochicalco. Caso (1962; 1967:166-186) only pointed out similarities between Xochicalco calendrical glyphs and later Mexica glyphs, however; he does not attribute these to "Nahua influence." Sāenz (1967: 17) interprets a carved relief of the New Fire glyph found north of Xochicalco as dating to the Epiclassic period; he goes on to use this interpretation as a basis for suggesting Nāhuatl as the most probable language of Xochicalco. He also lists Matlatzinca, Otomí, Toltec (s.i.c.), and Mixtec as other possibilities for the Xochicalco ethnic group. There is no basis at all, however, for Sāenz' proposed dating of the New Fire glyph. The carving was an isolated find with no archaeological associations, and the area immediately around Xochicalco was continuously occupied from Late Classic through Late Postclassic times. If the glyph is associated with Nāhuatl, then the relief almost certainly post-dates the major Epiclassic occupation of Xochicalco.

[3]The 1970 distribution of indigenous languages in Morelos was as follows:

Language	No. of Speakers
Nāhuatl	14,787
Mixtec	596
Otomí	203
Zapotec	172
"Other"	596

(Taken from Horcasitas de Barros and Crespo 1979:85)

[4]Luckenbach and Levy's (1980) reliance upon lexical data in the absence of phonological and grammatical information leads them to incorrectly classify the Xochixtlahuaca, Guerrero dialect together with Pochutec, the most divergent language in the Nahuan or Aztecan group (see Kaufman 1976a:958; Lastra 1974). Their date of A.D. 543 refers to the separation of these two languages from the rest of the Aztec complex, and

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is interpreted as indicating a central Mexican location for the various languages at that time (p. 459). However, it is more reasonable to use the A.D. 543 date to indicate only the divergence of Pochutec from the remaining Aztec stock (which is in line with Swadesh's original figure of 14 centuries of separation for Pochutec and central Mexican Nāhuatl--Swadesh 1954/55:180), and this particular split probably took place north of the central Mexican area as defined here (T. Knab, personal communication). This interpretation would imply that Nāhuatl entered central Mexico some time after the sixth century A.D. The succeeding major divergence postulated by Luckenbach and Levy takes place at A.D. 801, and correlates with the Pipil migrations (Campbell 1979:969 dates this divergence "at around 900 A.D."); this revision agrees generally with the reconstruction of Knab (n.d.), and would suggest that Nāhuatl entered central Mexico around this time.

[5]The major native historical sources on the Chichimec migrations are: Anales de Cuauhtitlan (1975:3-18); Muñoz Camargo (1892:19-68); Ixtlilxochitl (1975, I, II:passim); and the Historia Tolteca-Chichimeca (1947:passim). See Davies (1980:42-133) and Nicholson (1978) for discussion of these and other relevant sources.

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CHAPTER 3

POLITICAL EVOLUTION IN MORELOS FROM 1319 TO 1519: THE DOCUMENTARY DATA

Any reconstruction of Postclassic political evolution in central Mexico must begin with a discussion of political and territorial organization as described by the Spanish in 1519. While native historical accounts contain considerable information of political organization in earlier times, the amount of detail does not approach that available from 1519. Because a single set of basic political and territorial institutions and processes characterized central Mexican polities from the thirteenth century (at least) until the Spanish conquest (see Davies 1973b, 1980), models based upon the more complete data of the final period may be used to understand political developments several centuries earlier. For this reason, central Mexican political and territorial institutions are briefly described from conquest-period sources before turning to the processes of political evolution in Late Postclassic Morelos.

Postclassic Central Mexican Political and Territorial Organization

The primary political-territorial unit in central Mexico in 1519 was the city-state, consisting of a central town or city with surrounding rural villages. This polity is sometimes called "altepetl" in the historical sources, which may be defined as, "a community with laws,

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definite entrances and boundaries, land held in common, and a central settlement ruling over subject calpultin" (Licate 1980:36). The city-state was ruled by a tlatoani (pl. tlatoque) who usually inherited the position from his father or other close male relative, and ruled for life. In 1519, there were approximately fifty such city-states in the Basin of Mexico alone (Gibson 1964:34); Sanders estimates that "the average city-state in 1519 in the nuclear area [i.e. central Mexico] had 15,000-30,000 people, perhaps a fifth or a quarter of them residing in the central town and being primarily urban in their way of life" (Sanders 1971:15). As we shall see, the city-states of Morelos appear to have been smaller in area and population than their Basin of Mexico counterparts, with the central settlement usually less "urban" than those of the Basin of Mexico. These city-states, called "señoríos" or "pueblos por sí" by early Spanish observers (Gibson 1964:36), constitute category four in Ramírez de Fuenleal's (1870b:253) typology of tributary/subject relationship written in 1532. He states that while the rural towns or villages subject to the tlatoani may in turn have subject settlements of their own, only the central town or capital had a tlatoani (he uses the term "señor").

While the basic structure of the city-state at this level is fairly well understood (see Bray 1972; Gibson 1964:32ff), there were higher levels of territorial organization referred to by the same terms (altepetl or señorío) whose organization is not as clear. When one city-state conquered another, the loser became the subject of the victor; tribute was paid and the subject city-state had to acknowledge the superior status of the more powerful polity. The subject tlatoani and ruling lineage were usually left intact, however, thus creating a two-level

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structure with tribute being exacted at both levels. Licate describes such a two-level organization as follows:

> One ruler and his capital were recognized as supreme within the altepetl and received tribute and labor service from subject lords. Subject lords were semi-autonomous and held jurisdiction over designated bounded areas or shared authority in one or more settlements (towns or calpultin) (Licate 1980:39).

While both the subject polities with tlatoque and the whole two-level polity could be referred to as señoríos or altepeme (plural of altepetl), Ramírez de Fuenleal (1870b:253) distinguished them, classifying the more complex level as his type three and the less complex as his type four. Motolinía (1979:184) calls the larger level a "provincia"; the English version of this term (province) is used here. Well-documented examples of such provinces include Tlaxcala (see Motolinía 1979:184), Tlacopan (van Zantwijk 1969), Acolhuacan or Texcoco (Corona Sánchez 1976) and Cuauhnáhuac (see below). These provinces were corporate structures integrated by markets, ethnic affiliation, and other social and religious bonds in addition to the political tributary relations (Licate 1980:36-39).

In contrast to these localized corporate provinces, consisting of a group of city-states subject to and paying tribute to a more powerful city-state, were the territorial structures instituted by the Triple Alliance for purposes of collecting imperial tribute. These units, also referred to as "provincias" (see Barlow 1949b; Broda 1978), were built in the same manner as the local provinces--towns were conquered and forced to pay tribute, while the local tlatoani and other officials were left intact. Then a central town was chosen as a collection-point for the tribute from a number of towns in the area and a Triple Alliance official known as a calpixque was put in charge of collecting the tribute from

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these towns and forwarding it to the Triple Alliance capitals in the Basin of Mexico. These units, which Ramírez de Fuenleal (1870b:253) called calpiscazgos and are referred to here as Triple Alliance provinces, were identified by the name of their central tribute-collection town (Códice Mendoza 1980). Triple Alliance provinces often included a number of independent city-states and/or local provinces, and these polities maintained their territorial identities and local governmental structures; so long as the tribute payments continued, the Triple Alliance did not interfere in local politics. Ramírez de Fuenleal in 1532 described this situation as follows: "Mutizuma ponía un calpisque o mayordomo en una provincia, y muchas cabezeras y pueblos, que eran por sí, contribuían a donde estaba el calpisque, y estos no se deben tener por subjetos" (Ramírez de Fuenleal 1870a:236). The Triple Alliance provinces therefore were not corporate units; their only function was to facilitate tribute collection by the Triple Alliance, and they were held together only by tribute payments and the threat of military intervention by the Triple Alliance (Licate 1980:42f). The economic, political and ideological integration that characterized city-states and often local provinces was not a part of the Triple Alliance provinces, and on a higher level little attempt was made to politically or ideologically integrate these provinces into the Triple Alliance empire. A Triple Alliance province was an integrated corporate unit only if it happened to coincide with a prior local province (see Gibson 1971; Barlow 1949b; and Licate 1980 on Triple Alliance provinces).

This "artificial" nature of Triple Alliance provinces, especially those outside of the Basin of Mexico (see below), is an important factor

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in the reconstruction of local territorial organization. Because these tributary provinces did not necessarily correspond to local political units, Triple Alliance tribute lists (e.g. the Códice Mendoza 1980) cannot be used to reconstruct territorial organization in provincial areas. As discussed below, this is certainly the case in Eastern Morelos, where city-state capitals and province capitals are listed together, without distinction, under the Huaxtepec tributary province (Códice Mendoza 1980: 24v-25r).

In contrast to these lists of tribute goods and subject towns from the Triple Alliance bureaucracy, the various ruler-by-ruler lists of conquered towns contain important information on local territorial organization. These conquest lists, some prepared by Mexica or Triple Alliance sources and some by independent sources (see below) are never organized in terms of the Triple Alliance provinces of 1519. Rather, they report the towns conquered by different tlatoque in the order of conquest, and the territorial information they contain relates to local, not Triple Alliance, organization. For purposes of the present analysis, the major principle to be used is that when a given city-state was conquered and forced to pay tribute (by the Triple Alliance or by another city-state or province), not only did that city-state become a subject of its conqueror, but all of its subjects (towns, villages, city-states, or whatever) in turn became subjects of the conquering polity. This is a clear consequence of the hierarchical structure of Late Postclassic polities, and is documented for three areas:

(1) Postclassic wars of conquest. Ixtlilxochitl (1975, II:106) reports that when Nezahualcoyotl of Texcoco conquered Cuauhnáhuac, he gained an

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additional nine towns that had been subject to the Morelos polity. Additional examples are found scattered through the native historical accounts.

(2) The Spanish conquest. When Cortés conquered the province-capital of Cuauhnáhuac in 1521, not only did the Cuauhnáhuac tlatoani surrender, but nineteen other "caciques" surrendered as well; these caciques were probably the tlatoque of city-states subject to Cuauhnáhuac (Díaz del Castillo 1955: 480; see Gerhard 1970a:33).

(3) Encomienda assignments. In his analysis of early Colonial encomiendas, Gibson (1964:72) shows that the grants were made by cabeceras (either city-state capitals or province capitals), and that they implicitly included all settlements and Indians subject to the cabecera. Gibson (1964:65ff) discusses how the encomienda grants reflected native local territorial organization, and thus represent the continuation of Prehispanic hierarchical political structures.

This well documented principle permits the inference that if two city-states are present in a single list of conquests (of a Mexica tlatoani, for example), then there did not exist a subject/tributary relationship bewteen them at the time of their conquest. If one of the polities had been subject to the other, then only the superior city-state capital (or province capital) would be included in the conquest list. This inference will be used below to reconstruct aspects of Morelos territorial organization based upon Mexica and Acolhua conquest lists.

Morelos and the Tepanec Empire, 1371-1428

There is one dated reference to Cuauhnáhuac in the central Mexican native historical record prior to the time of the Tepanec empire. This

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concerns the expulsion of the Mexica from their temporary home in Chapultepec in 1319. This date, usually given as 2 Acatl in the Culhua calendar, is regarded by Davies as "the earliest in Mexica history that can be fixed with assurance" (1980:183). Since their arrival in Chapultepec some time before this date (approximately 70 years prior to 1319 if the migration chronology of the previous chapter is valid), the Mexica had grown in numbers and power. Perhaps because they were perceived as a threat to the surrounding city-states of central Mexico, a number of polities including Xaltocan, Azcapotzalco, Culhuacan, and Xochimilco, joined together to defeat the Mexica in battle and drive them out of Chapultepec (see Davies 1973a:28-30; 1980:184-89). The Códice Mexicanus (Mengin 1951: 434) shows Cuauhnáhuac as one of the polities allied against the Mexica, and Chimalpahin (1965:58) states that several of the Basin of Mexico allies passed through Cuauhnáhuac on their way to surround Chapultepec. After the Mexica defeat, the Anales de Tlatelolco (1948:36) notes that many of their women were carried off by the victors, stating that some were taken to Cuauhnáhuac. This defeat of the Mexica by a force of allied polities is but one of the many military operations that took place in a context of shifting alliances and near-constant warfare among the numerous small city-states of central Mexico in the early fourteenth century (see Davies 1980). The presence of Cuauhnáhuac among the allies at Chapultepec probably implies that the Morelos polity was of a size and power comparable to the other city-states involved.

This pattern of temporary alliances among competing small city-states continued until the mid-fourteenth century. Davies notes that a common situation at this time was, "a state of affairs whereby one

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city-state assumed a leading role within a given region, but failed to achieve total domination" (1980:174). The leading polities in this respect prior to 1371 were Culhuacan, Tenayuca, Xaltocan and Coatlichan (Davies 1980). However, the middle decades of the fourteenth century witnessed a growth in power of the Tepanec polity centered in the city-state of Azcapotzalco. With the accession of Tezozomoc in 1371, the Tepanecs embarked upon a series of conquests of surrounding city-states, and by the third decade of the fifteenth century had forged an empire covering most of the Basin of Mexico and some territory beyond the Basin proper, perhaps including part of Morelos. Before addressing the problem of the status of Morelos relative to the Tepanec empire, some words must be said about the relationship between the Tepanecs and the Mexica in this period.

After their Chapultepec defeat in 1319, the Mexica spent some time in the Culhuacan city-state, returning later to an island in Lake Texcoco opposite Chapultepec to found their capital Tenochtitlan in 1345 (Davies 1973b:45-47). From this time until 1428, the Mexica were subjects of the Tepanec polity, paying tribute to Azcapotzalco (e.g. Tezozomoc 1975a:231f; Anales de Tlatelolco 1948:48) and otherwise recognizing the dominant political status of the Tepanecs. Mexica armies participated in most of the wars of conquest that established the Tepanec empire, fighting under the direction and control of the Tepanec tlatoani (Tezozomoc after 1371). The dominant role of Azcapotzalco is somewhat obscured by the fact that after its overthrow by the Mexica and others in 1428, the Tepanec histories were destroyed and chronicles were rewritten to glorify the Mexica at the expense of their former overlords (Sahagún 1950-69, bk. 11:191). For

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example, the conquests of Tenayuca in 1371 and Culhuacan in 1377, in which the Mexica participated as mercenaries or as subjects of the Tepanecs (see Davies 1980:218-224), are attributed solely to the Mexica in their own historical accounts (e.g. Códice Mendoza 1980:2r). As Davies emphasizes,

> it should never be forgotten that the master-mind behind the strategy [of expansion] was that of Tezozomoc, not of Acamapichtli or his successor Huitzilihuitl [the first two Mexica tlatoque], and that the high command operated from Azcapotzalco, not Tenochtitlan (Davies 1980:220).

Barlow (1946) has identified the Anales de Cuauhtitlan (1975), the Leyenda de los Soles (1975), Nazareo et al. (1940), the Anales de Tlatelolco (1948) and the Códice Mendoza (1980) as the most informative and consistent sources listing the conquests of the Mexica, including the Tepanec-Mexica conquests. As shown in Table 5, four of these five sources list Cuauhnáhuac as one of the four towns or polities subdued by the first Mexica tlatoani, Acamapichtli; the other three towns appearing with Cuauhnáhuac are the chinampa towns of Mizquic, Xochimilco and Cuitlahuac. The Anales de Tlatelolco (1948:15) attributes conquest of these four towns to Huitzilihuitl, the succeeding Mexica tlatoani; however, this is almost certainly an anachronism, since, (1) this source lists no conquests for Acamapichtli, and (2) the four towns involved are not listed as conquests of Huitzilihuitl in any other source. The Anales de Tlatelolco therefore is probably referring to Acamapichtli conquests in the passage cited. It should be noted, however, that three additional sources list the three chinampa towns as Acamapichtli conquests, but omit Cuauhnáhuac (Historia de los Mexicanos 1941:229; Códice Azcatitlan 1949:pl. 14; Códice Mexicanus 1952:pls. 53-56). This is in contrast to later Triple Alliance conquests of

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TABLE 5

POSSIBLE PRE-ITZCOATL CONQUESTS IN MORELOS BY THE MEXICA AND ACOLHUA

	Mexica Sources								Acolhua Sources	
	Anales de Cuauhtitlan 1975:66	Leyenda de los Soles 1975:128	Nazareo et al. 1940:118f	Códice Mendoza 1980:2v	Anales de Tlatelolco 1948:15	Mendieta 1971:148	Historia de los Mexicanos 1949:226	Chimalpahin 1965:83	Ixtlilxochitl 1975,I:319	Ixtlilxochitl 1975,I:430
Acamapichtli Conquests										
Cuauhnāhuac	x	x	x	x	-	x	-	-	-	-
Conquests incorrectly attributed to Huitzilihuitl										
Cuauhnāhuac	-	-	-	-	(x)	-	-	-	-	-
Yacapichtlan	-	-	-	-	-	-	(x)	(x)	-	-
Quinatzin II Conquests										
Totolapan	-	-	-	-	-	-	-	-	x	x
Huaxtepec	-	-	-	-	-	-	-	-	x	x
"Todas las tierras de Tlahuic"	-	-	-	-	-	-	-	-	x	-

Cuauhnáhuac, which are recorded in many sources in addition to official Mexica histories; thus some doubt may be cast upon the historicity of the Tepanec-Mexica conquest of Cuauhnáhuac. If the conquest did take place, it was probably in the period from 1375-1380.

If the four conquests of the Anales de Tlatelolco (1948:15) are attributed to Acamapichtli, then none of the five major sources on Mexica expansion mention any conquests of Huitzilihuitl in Morelos. Chimalpahin (1965:83) mentions a conquest of Yacapichtlan in 6 Acatl (=1407), while the Historia de los Mexicanos (1941:229) lists "Capiscla," probably the same place, as a conquest of Huitzilihuitl. Davies (1980:226,246) assumes that the Yacapichtlan in question may be identified with the town of that name in northeastern Morelos, but this identification must be questioned. Chimalpahin's Relaciones (1965) were written primarily about the Chalco area and people, and references to Morelos are generally limited to major events like conquests. Although the reference to Yacapichtlan here does concern conquest this same Yacapichtlan is mentioned throughout Chimalpahin in the context of less dramatic events, often portrayed as occurring in the immediate vicinity of Chalco (e.g. 1965:78f,83,154,177f,230,247). There is a settlement called Yacapichtlan quite near Chalco itself, and Chimalpahin's reference to the conquest of Yacapichtlan in 1407 probably refers to this town. Such an interpretation is strengthened by the context of "Capiscla" in the Historia de los Mexicanos, where it is listed together with "Cuauximilco en la provincia de Chalco" (1941:229); furthermore, all of the major Mexica conquest lists (with the exception of the Anales de Tlatelolco) list Chalco among the conquests of Huitzilihuitl. I therefore conclude that Huitzilihuitl did <u>not</u> conquer any towns in Morelos; similarly,

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none of the historical sources list any Morelos conquests for his successor, Chimalpopoca. Davies includes the following Morelos towns in a map of "places named in conquest lists of Acamapichtli and Huitzilihuitl" (1980: 246): Cuauhnáhuac, Yacapichtlan, Yauhtepec, and Xiuhtepec. However, all but the first are spurious events; the Yacapichtlan problem is discussed above, while the latter two towns are not in any conquest lists until the reigns of Itzcoatl (Xiuhtepec) and Moctezuma Ilhuicamina (both towns). Davies does not give any citations or discussion in the text on his inclusion of these towns in his map.[1]

Most authorities agree that parts of Morelos, including Cuauhnáhuac, were included in the Tepanec empire (Carrasco 1950:268-272; Jiménez Moreno 1954/55:230; Davies 1980:241f). There are several kinds of evidence for this in addition to the already-mentioned Tepanec-Mexica conquest of Cuauhnáhuac under Acamapichtli. First, the Anales de Tlatelolco (1948:22) reports that Tezozomoc installed a number of his sons as leaders ("soberanos") in various subject city-states, including Cuauhnáhuac (and Coyoacan, Tepechpan, Acolman, and Tlacopan), where Moquiuix was imposed. However, other sources that speak of Cuauhnáhuac rulers at this time do not mention Moquiuix, and this statement may be questioned (see above). Second, the Memorial de los Pueblos Sujetos a Tlacopan (Memorial de los Pueblos 1940) contains a list of towns which probably correspond to places subject to Azcapotzalco under Tezozomoc[2] and several Morelos towns are included in this list. While Carrasco (1950: 271) shows only four such towns in Morelos--Anenecuilco, Xoxotlan, Xoxocotlan, and Miacatlan--the list also includes Cohuintepec, Amacoztitlan and Molotlan (Memorial de los Pueblos 1940:119). With the exception

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of Anenecuilco, all of these towns are in western Morelos and were subjects of Cuauhnāhuac in 1519. Other towns in the same list are located in the southeastern Toluca Valley just over the mountains from western Morelos (see Carrasco 1950:271) and the area covered by the Morelos towns is clearly an extension of the Tepanec territory in the Toluca Valley (see Figure 3).

Given therefore that at least part of western Morelos was somehow incorporated into the Tepanec empire, what does this imply in terms of political and economic relations between Morelos and the Basin of Mexico? The only mention of possible tribute payments from Morelos to the Basin of Mexico at this time is found in the Memorial de los Pueblos, where the above-mentioned list including Morelos towns is prefaced by the following statement:

> Estos pueblos y estancias que aquí eran sujetos a Tlacupan y en ellos no había señor sino mayordomos y principales que los regían, todos eran como renteros del señor de Tlacupan, y demas de sus tributos tenía en estos pueblos el señor de Tlacupan muchas tierras que le labran . . . . (Memorial de los Pueblos 1940:119).

It is not clear whether this conquest period description of two types of Tepanec-controlled land in Morelos (probably tlatocatlalli, or land attached to the office of tlatoani and worked by natives as "renteros," and pillalli, or private holdings of nobles; see Gibson 1964:257-264 on land tenure) also pertains to the earlier Tepanec empire. If Carrasco (1950:269f) is correct in associating the town list with the earlier period, then the description of land holdings and tribute probably applies as well. It is significant that Cuauhnāhuac is not included in the Memorial de los Pueblos list; this implies that the apparently strong Tepanec control of the western Morelos area was limited to the vicinity

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Figure 3. Morelos territorial organization during the Tepanec period.

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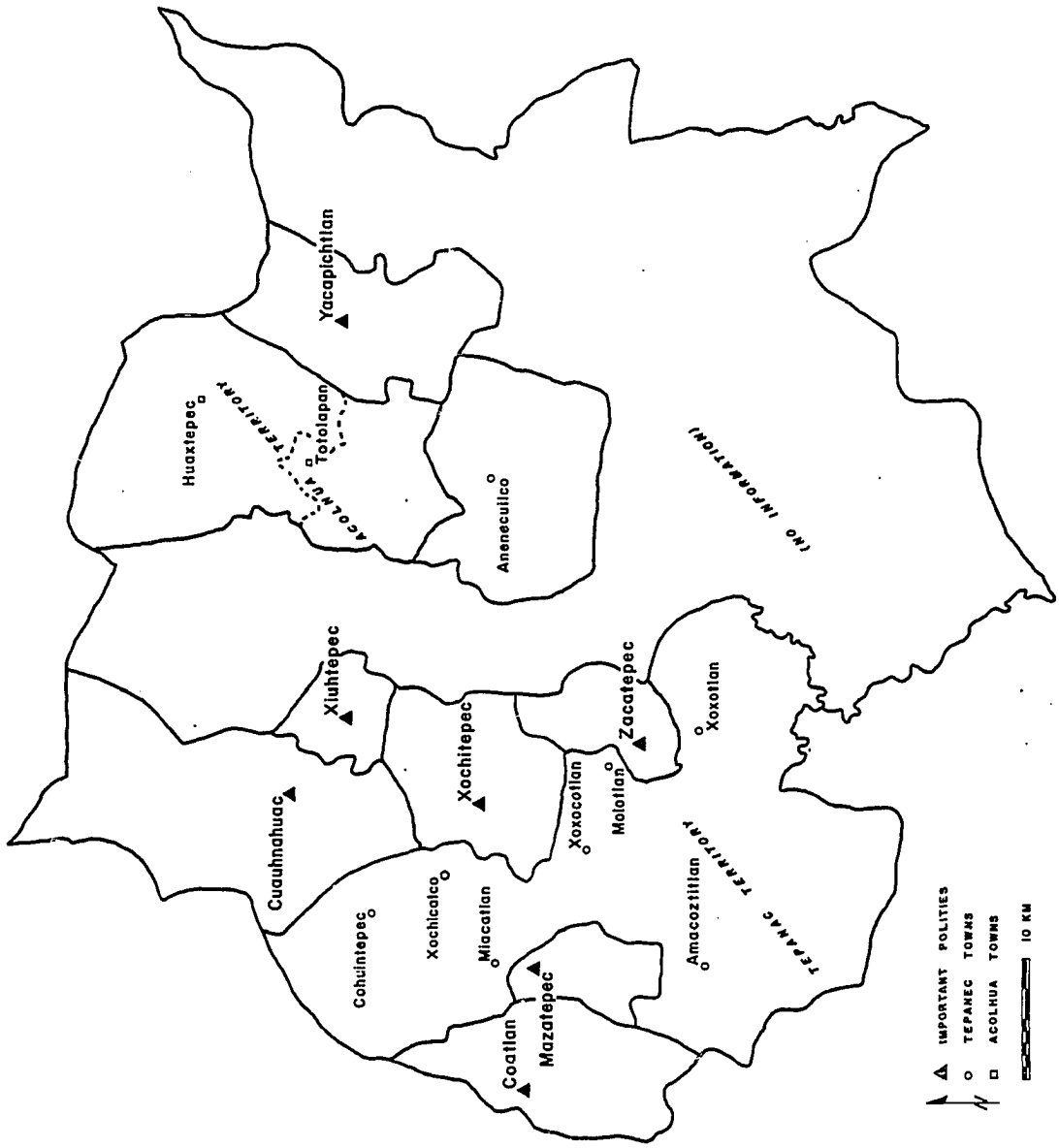

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of the towns listed. The fact that Cuauhnáhuac may have been conquered by Tepanec-Mexica forces does not necessarily imply that it was strongly controlled by the Tepanecs, or even that tribute was paid at this time. None of the sources speak of Cuauhnáhuac tribute to either Azcapotzalco or Tenochtitlan, and several sources explicitly say that Cuauhnáhuac started paying tribute to Basin of Mexico polities only after it was conquered by Itzcoatl and Nezahualcoyotl, a decade after the fall of the Tepanec empire (see below). The political status of Cuauhnáhuac in the Tepanec empire may thus correspond to the situation described by Davies as follows:

> In the process of Mesoamerican empire building, an intermediate category of places may exist that are neither subject nor free at any given moment; they may have been the object of initial attacks by their would-be assailant without having been fully subjugated; the same names thus recur with unfailing regularity in the conquest lists of successive Aztec [sic] tlatoanis (Davies 1980:245).

In line with this characterization of Cuauhnáhuac's status, there are a number of lines of evidence suggesting that while Cuauhnáhuac may have been incorporated in some manner into the Tepanec empire, the Morelos city-state was a strong, at least semi-independent polity at this time. First, the Relación de la Genealogía (1941:250) reports that after the fall of Culhuacan (in 1377; see Davies 1980:219), central Mexico was ruled by an alliance of five towns, including both Azapotzalco and Cuauhnáhuac. Tezozomoc, the Tepanec tlatoani,

> comenzó a señorear la tierra desde entonces sín reconocer a otro superior. Junto con el había otros cuatro Señores principales, que era el de Quatlichan y el de Amequemeca y el de Huexotzinco y el de Quauhnáhuac: estos cuatro comenzaron entonces también a mander y señorear juntamente con el señor de Azcapotzalco; no empero eran tan principales . . . porque estos cuatro señores tenían obedencia y reconocimiento al Señor de Azcapotzalco (Relación de la Genealogía 1941:250).

Thus while Tezozomoc was the supreme leader, the tlatoque of the other

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four polities ruled together with him, acknowledging his superior status. Nothing is said about these four sub-leaders paying tribute to Tezozomoc, and this relatively decentralized political organization was explicitly contrasted in the source with the strong unitary monarchies of Tula and Culhuacan prior to 1377, and of Tenochtitlan after 1428 (pp.250f).

The second line of evidence for the powerful status of the Cuauhnáhuac polity during the time of the Tepanec empire concerns the marriage of Huitzilihuitl to Miahuaxihuitl, daughter of the Cuauhnáhuac tlatoani Tezcacohuatzin.[3] This event is well represented in the historical sources, as one product of the marriage was the birth of Moctezuma Ilhuicamina, fifth Mexica tlatoani (e.g. Historia de los Mexicanos 1941: 229; Torquemada 1969, I:104; Tezozomoc 1975b:90-95; Chimalpahin 1965:183; Durán 1967, II:65f; Nazareo et al. 1940:122). The two primary descriptions of this episode give somewhat different motivations on the part of Huitzilihuitl for soliciting the marriage alliance. Tezozomoc (1975b:90f) relates that his desire to obtain Morelos cotton for the Mexica was the primary motivation, while Torquemada (1969, I:104) states that the marriage was part of a more general desire of Huitzilihuitl to increase the number of his allies and his political standing by contracting advantageous marriage alliances. He had previously married Ayauhcihuatl, daughter of Tezozomoc (Torquemada 1969, I:103), but,

> no se contentó con tener la hija del Emperador Tezozomoctli. Pero pareciendole, que emparentando con muchos Reyes, y Señores, estaría más engrandecido, y tendría más favor, y ayuda en sus necesidades, determinó de emparentar (se pudiese) con el Señor de Quauhnáhuac (Torquemada 1969, I:104).

Both sources indicate clearly that Huitzilihuitl was marrying up by contracting an alliance with the Cuauhnáhuac royal line. His petition to

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the Cuauhnāhuac ruler was initially refused with scorn on the grounds that the Mexica island capital of Tenochtitlan was a crude, uncomfortable settlement, and that Huitzilihuitl would not be able to provide Miahuaxihuitl with the fine foods (tropical fruits from Morelos) and clothes (of cotton) to which she was accustomed as a Tlahuica princess (Tezozomoc 1975b:93). Although Tezozomoc (1975b:90-95) relates a story whereby Huitzilihuitl won Miahuixihuitl by sorcery and magic, Torquemada (1969, I:104) states that Tezcacohuatzin finally condescended ("condescendío") to marry his daughter to the Mexica leader, and that she was received at Tenochtitlan with great celebration ("con grandes fiestas").

This marriage probably occurred in 1396 or 1397, since Moctezuma Ilhuicamina was born in 10 Tochtli = 1398 (Chimalpahin 1965:183). Several sources state that prior to this time the Mexica did not have cotton for fine clothes, relying instead upon the much coarser maguey fiber; after the marriage, the Mexica started using Morelos cotton regularly (Torquemada 1969, I:104; Tezozomoc 1975b:90-95; see also Anales de Cuauhtitlan 1975: 66). Cotton cloth had been utilized for clothing in the Basin of Mexico for at least several centuries prior to this time (Ixtlilxochitl 1975, I: 273f,397; II:26; Franco 1956), and the fact that the Mexica did not have access to this fiber before 1398 may be seen as an indication of their lack of economic and political influence within central Mexico. After 1398, Morelos cotton was almost certainly transferred to the Mexica through the mechanism of trade across the Ajusco mountain range, and not through tribute or gift-exchange; there is no evidence of Cuauhnāhuac paying tribute, in any form, to the Basin of Mexico prior to 1438, and there is documentation of a long-standing trade in cotton in 1429 (see below).[4]

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The marriage between Miahuazihuitl and Huitzilihuitl was only one of a number of marriages for political alliance between the Cuauhnáhuac ruling lineage and various royal dynasties of the Basin of Mexico. According to an account in Nazareo et al. (1940:122), this marriage was the first of several such alliances between Cuauhnáhuac and Tenochtitlan (see Figure 4). Miahuaxihuitl's niece Chichimecacioatzin married Moctezuma Ilhuicamina (her cousin), and their daughter married Tezozomoctli (son of Itzcoatl) to produce Axayacatl, the sixth Mexica tlatoani. The earliest reference to such a royal marriage is the statement of Ixtlilxochitl (1975, I:424) that Tocpacxochitzin, the granddaughter of "Chalhiuhtona, señor de Tlahuic," married Tlotzin, the semi-mythical Acolhua-Chichimec emperor. Of greater historical reliability is the account in the Anales de Tlatelolco (1948:23) that two sisters of Acolmiztli (Tlatelolco tlatoani, 1407-1426) married Cuauhnáhuac nobles, and that a third sister married a noble of Huaxtepec. Such marriages for political alliance were common among the city-states of Postclassic Mesoamerica (Bray 1972; Spores 1974), and Cuauhnáhuac's participation in these, especially its dominant position with respect to Huitzilihuitl, indicate something of the political and economic importance of the Morelos polity during the period of the Tepanec empire.

A third place of evidence for the powerful nature of the Cuauhnáhuac polity is its inclusion, together with six other Morelos towns, in a list of 46 central Mexican towns allied with Techotlalatzin, the tlatoani of Texcoco in the period 1377-1409 (Códice Xolotl 1951:pl.6; Ixtlilxochitl 1975, I:324). Although Ixtlilxochitl, in his interpretation of the Códice Xolotl, states that these towns were subjects of Texcoco (pp. 324f), this

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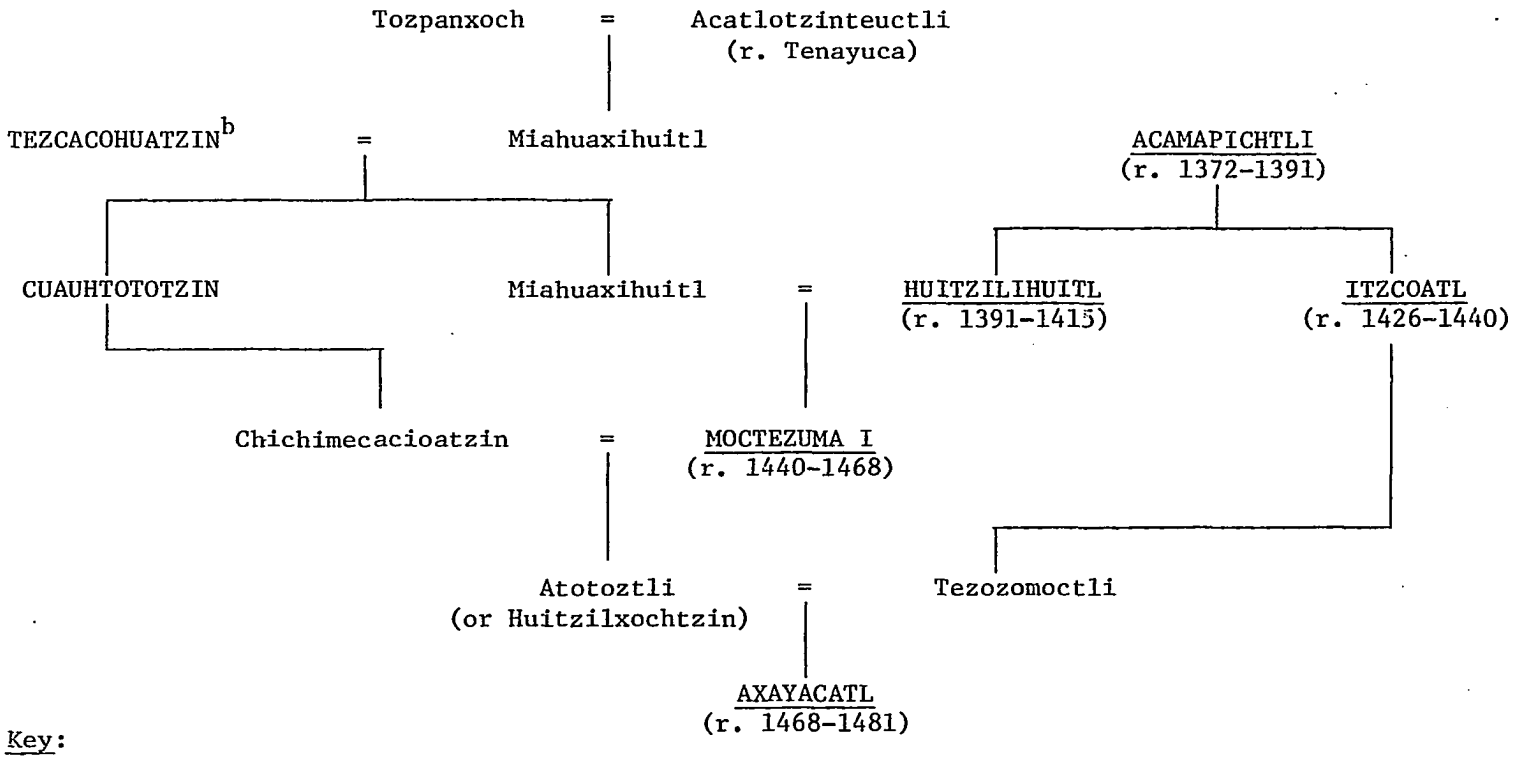

Figure 4. Intermarriage between Cuauhnáhuac and Tenochtitlan ruling families.[a]

Notes:

[a]The marriages are taken from Nazareo et al. (1941:122); dates are those of Davies (1973a:305).

[b]See note 2 to Chapter 3 for alternative versions of Tezcacohuatzin's name.

is probably an expression of his glorification of Acolhua political history. Dibble (1951:84) on the other hand suggests that these towns were merely allies of, or at least had friendly relations with, Techotlalatzin (see also Offner 1979). In addition to Cuauhnáhuac, the list includes from Morelos Yacapichtlan, Mazatepec, Xochitepec, Coatlan, Zacatepec, and Xiuhtepec. I interpret the presence of these towns in the list of allies of Techotlalatzin to mean that they were relatively important city-states at the time, either independent or perhaps part of a new Cuauhnáhuac province; the locations of these towns are given in Figure 3.

The fourth and final line of evidence of Cuauhnáhauc's political status at the time of the Tepanec empire consists of two accounts in the Anales de Tlatelolco of military campaigns undertaken by the Morelos polity. The first, dated at two years before the accession of Acamapichtli (i.e. in 1370), simply relates that "los quauhnauaca llaman por primera vez a las armas. Los quauhnauaca codiciaban Tzacualtitlan [one of the tecpans of] Chalco (Anales de Tlatelolco 1948:51). It is not clear from this enigmatic report what the "call to arms for the first time" means, nor what the outcome of this manoeuvre was.

The second report of Cuauhnáhuac warfare is much clearer; the armies of Cuauhnáhuac attacked and conquered the Cohuixca of Guerrero in 2 Acatl (=1423, Culhua count), and "permitted" the tlatoque of Tenochtitlan and Tlatelolco to participate in the victory:

> Estos couisca no fueron una conquista del mexicatl. Los señores de Quauhnáuac solo les permitieron participar en la ganancia. Por eso tuvieron parte en el botín Tlacateutzin, soberano de Tlatelolco y Chimalpopocatzin [third tlatoani] de Tenochtitlan (Anales de Tlatelolco 1948:57).[5]

The emphasis here on the secondary role of Tenochtitlan and Tlatelolco in

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a Mexica/Tlatelolca source indicates the dominance of Cuauhnáhuac in this event, thus reinforcing the notion of Cuauhnáhuac as a strong and independent power in central Mexico.

Before summarizing the available data on the Cuauhnáhuac polity prior to 1428, reports of Acolhua conquests in Morelos at this time should be mentioned. The major Acolhua conquest lists relate that Quinatzin II conquered Totolapan and Huaxtepec in Morelos (Códice Xolotl 1951: Plate 4; Ixtlilxochitl 1975, I:319,430; see Table 5). Davies gives 1330(?) to 1377 as the dates for Quinatzin's rule (1980:59). Ixtlilxochitl (1975, I:318f) states that these conquests were carried out in conjunction with Acamapichtli of Tenochtitlan; this would bracket the events between 1372 (Acamapichtli's accession) and 1377 (Quinatzin's death). Quinatzin is also credited with conquests outside of Morelos of Cuitlahuac, Mizquic, Huehuetlan, and Sayula. At this time, Huaxtepec is said to have been subject to Acacitzin, one of the leaders ("señores") of Chalco, while Totolapan was subject to "the empire" ("perteneciente a la recamara del imperio"), presumably the Acolhua empire (Ixtlilxochitl 1975, II:33). Just prior to the death of Quinatzin, Huaxtepec, Totolapan and several other subject polities rebelled, but they were promptly re-conquered by the Acolhua leader (Ixtlilxochitl 1975, I: 534; II:33). Of these rebellious polities, it is said that Totolapan "era la mayor fuerza de sus [Quinatzin's] enemigos" (Ixtlilxochitl 1975, I:319), and the political status of the two towns is described as "en aquellos tiempos eran cabeceras de provincia" (p. 430).

In conclusion, available evidence suggests that at the time of the Tepanec empire, several territorial units may be identified in Morelos. In western Morelos, a number of towns may have paid tribute to Azcapotzalco,

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and included private lands of the Tepanec ruler Tezozomoc. In eastern Morelos, two major towns are listed as subjects of the Acolhua-Chichimec empire headed by Quinatzin II. Cuauhnáhuac was weakly integrated into the Tepanec empire, pursuing an independent course of increasing political and economic importance in central Mexico. Although listed as a Tepanec-Mexica conquest of Acamapichtli, Cuauhnáhuac paid no tribute to the Tepanecs or Mexica at this time. It was one of the five polities that ruled central Mexico as part of the Tepanec alliance, and was actively sought as a marriage alliance partner by the still-weak Mexica and the Tlatelolca. By the end of the Tepanec period, Cuauhnáhuac carried out conquests of adjacent areas of Guerrero and was in a position to "permit" the tlatoque of Tenochtitlan and Tlatelolco to share in the fruits of victory. Tezozomoc's description of the Cuauhnáhuac tlatoani Tezcaco-huatzin having a large domain that yielded considerable tribute in cotton and fruit (1975b:90) suggests that Cuauhnáhuac may have been the capital of a province with dominion over several other city-states at this time. We know that in the following period, the area covered by five of the other six Techotlalatzin allies in Morelos (all but Coatlan) was probably part of the Cuauhnáhuac province (see below), so this polity may have existed during the Tepanec period as well. Cuauhnáhuac's period of strength and independence was ended a decade after the fall of Azcapotzalco and the Tepanec empire when Itzcoatl and the Triple Alliance conquered the polity and instituted tribute requirements.

Conquest of Morelos by the Triple Alliance

The Tepanec empire came to an end with the overthrow of Azcapotzalco by the Mexica and Acolhua (with help from Huexotzinco) in

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1428. This victory signalled the formation of the famed Triple Alliance of Tenochtitlan, Texcoco, and Tlacopan, and was the first of many wars of conquest that would eventually extend throughout Mesoamerica. Between the Azcapotzalco war and the Triple Alliance conquest of Morelos in 1438, we learn of a regular trade in cotton and other goods between Cuauhnáhuac and Tenochtitlan. Durán (1967, II:107f) and Tezozomoc (1975a:273f) relate an episode in which a number of Mexica merchants, returning from Cuauhnáhuac with loads of cotton cloth, fruit and chiles to sell in Tenochtitlan, were molested and robbed by a squad of Xochimilca soldiers. The merchants went before Itzcoatl, the Mexica tlatoani, and complained as follows:

> Señor poderoso, estos que presentes estamos, habíamos salido a los tratos y granjerías que solemos, y viniendo de Cuauhnáhuac con el resgate de algodon que solemos, salieron a nosotros los Xochimilcas y nos robaron y maltrataron de la suerte que ves . . . (Durán 1967, II:108).

Although presented in Durán and Tezozomoc chiefly as an illustration of the growing animosity between Xochimilco and Tenochtitlan (leading to Itzcoatl's conquest of the former polity in 1430), this episode is significant for the light it sheds on economic relations between Cuauhnáhuac and Tenochtitlan in the decade prior to Itzcoatl's conquest of Morelos. First, the trade was carried out by independent Mexica merchants who had obtained the cotton in Cuauhnáhuac by trade or exchange, and who were planning to sell it in Tenochtitlan ("unos mexicanos mercaderes . . . con cargos de algodón resgatado para vender en su ciudad"--Durán 1967, II:107; emphases added). Second, in their complaint to Itzcoatl, the merchants stress that this was their normal or usual trade ("los tratos y granjerías que solemos," "el resgate de algodón que solemos"--p. 108; emphases added),

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thus imputing some time depth to the exchange. It is suggested in the previous section that this trade may date back as far as Huitzilihuitl's marriage to Miahuaxihuitl around 1396, since there is no evidence prior to 1438 of tributary relations that could supply the Mexica with Morelos cotton.

Because Durán and Tezozomoc do not give a year for the occurrence of this event (they rarely give dates), it must be dated through comparison with other historical sources. The relevant chronological sources are portrayed in Table 6, which is divided into sources yielding relative dates (events are depicted sequentially, providing a relative chronology by page and chapter), and sources giving dates in years. Durán and Tezozomoc include the cotton trade incident between Itzcoatl's conquests of Coyoacan and Xochimilco. Using Chimalpahin, the Anales de Tlatelolco and Ixtlilxochitl to date these conquests yields a likely 1429 or 1430 date for the event. The Códice Aubin has an entry for 1429 which probably describes the event under consideration: "Aquí stajaron a los de Quauhnáhuac en al año 1 Tecpatl" (Códice Aubin 1963:62; see note b to Table 6 for the calendrical conversion used). This ambiguous statement could refer either to people from Cuauhnáhuac (i.e. who lived there) or to anyone who had just been there (e.g. Mexica merchants). However, since the description fits the cotton trade incident (attack on the Mexica merchants), and falls in the same year, it probably is a reference to that event. In any case, the dates in Table 6 make it clear that this trade was flourishing nearly a decade prior to Itzcoatl's conquest of Cuauhnáhuac.

The conquest of Cuauhnáhuac by Itzcoatl occurred sometime in the late 1430's; the available dates are listed in Table 6 (1433, 1437, 1438, 1439). Chimalpahin (1965:96,196) explicitly states that Cuauhnáhuac was

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TABLE 6

CHRONOLOGY OF SELECTED CONQUESTS AND EVENTS DURING THE REIGN OF ITZCOATL

Conquests and Other Events	Relative Dates (Chapters)[a]			Absolute Dates (Years)					
	Durán 1967, II	Tezozomoc 1975a	Torquemada 1969, I, Bk. 2.	Chimalpahin 1965: 93-96; 191-196	Anales de Tlatelolco 1948:53-56	Ixtlilxochitl (O'Gorman 1975:108f)	Códice Aubin 1963:62-64	Tezozomoc 1975b:108f	Códice Mexicanus 1951:61-64
Azcapotzalco	9	14	37	1428	1428	1428	-	1428	1429
Coyoacan	10-11	15	40	1429	1429	-	-	-	-
COTTON TRADE	12	16	-	-	-	-	1429[b]	-	-
Xochimilco	12-13	17	42A	1430	-	1429	-	-	-
Mizquic	-	-	-	1432	-	-	-	-	-
Cuitlahuac	14	18	42B	1433	-	1430	-	-	-
Cuauhnáhuac	-	-	42C	1439	1433	-	1437[b]	1438[c]	-
Death of Itzcoatl	15	18-19	42D	1440	1439	1440	1440	1440	1441

[a]Duran, Tezozomoc and Torquemada give few specific dates for historical events; they do present historical information sequentially, however. This yields a relative chronology of events by chapter. The four events described in chapter 42 of Torquemada are presented in the order listed (A through D).

[b]These two dates in the Codice Aubin have been advanced one year from their correlation in the Tenochca count (i.e. 1 tecpatl = 1428 + 1 = 1429; etc.) because this source is one year behind the consensus chronology followed here (see Davies 1973a:305). Thus the Cuauhnáhuac conquest, described as 3 years prior to Itzcoatl's death, makes more sense in 1437, given that Itzcoatl died in 1440, than in 1436 as is given in the Codice.

[c]This date is based on the statement that Cuauhnáhuac was conquered 40 years after the birth of Moctezuma Ilhuicamina (Tezozomoc 1975b:95), which occurred in 1398 (see text).

conquered in the year before Itzcoatl died (although Barlow 1948a:184 asserts without explanation that Chimalpahin confuses Cuauhtitlan and Cuauhnáhuac in this passage), while the Códice Aubin lists three years between the conquest and Itzcoatl's death (1963:64). The date of 1438, given by Tezozomoc (1975b:95), will be accepted here as a reasonable estimate for the conquest of Cuauhnáhuac. Clavigero (1964:105) concurs that the conquest occurred late in Itzcoatl's life, stating, "parece haber sido a lo último del reinado de Itzcoatl."

The historical sources state or imply that Cuauhnáhuac had considerable military strength and that this was not an easy victory for Itzcoatl. Torquemada (1969, I:149f) relates a story whereby the conquest was precipitated by the tlatoani of nearby Xiuhtepec, who was angered when the Cuauhnáhuac tlatoani insulted him by refusing to enter a marriage alliance. This leader then petitioned the three Triple Alliance tlatoque (Itzcoatl, Nezahualcoyotl, and Totoquihuatzin) for aid in fighting Cuauhnáhuac. The four leaders each brought an army and attacked Cuauhnáhuac simultaneously from four different directions. Even with such a heavy attack force, it took considerable fighting before the well-defended city fell. Chimalpahin (1965:96) says that the city was defeated after a year of battle, while Tezozomoc (1975b:95) states somewhat enigmatically that Cuauhnáhuac was only conquered after 40 years of war which started at the time of Moctezuma's birth in 1398 ("por cuarenta años hubo guerra en Cuauhnáhuac, y entonces se les conquistó"). While the Xiuhtepec tlatoani may have had the satisfaction of seeing his rival city-state defeated, he does not appear to have benefited from the affair--Xiuhtepec is listed as merely another Itzcoatl conquest in most sources (see Table 7).

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This conquest of Cuauhnáhuac marked the start of tribute payments from Cuauhnáhuac to Tenochtitlan. Chimalpahin (1965:96) and the Códice Aubin (1963:64) both state that for one year, Cuauhnáhuac was in servitude ("servidumbre") to Itzcoatl's palace, after which regular tribute payment began. The nature of this tribute is indicated by Torquemada:

> Con esta perdida . . . y desde entonces [Cuauhnáhuac] quedó tributario, al Reino de México, y le reconocio, con mantas huipiles, y naguas de algodón, y el mismo algodón, en capullo (Torquemada 1969, I:150).

Itzcoatl's conquest of Cuauhnáhuac therefore allowed the prior Morelos-Tenochtitlan cotton trade to be replaced by cotton tribute; it is important to note that this tribute consisted of both woven garments and raw cotton ("en capullo"). Acolhua sources agree that tribute payments started at this time, although the tribute is described as going to Texcoco rather than Tenochtitlan (Ixtlilxochitl 1975, II:106f).

The conquest of Cuauhnáhuac, described by Torquemada (1969, I:150) as a Triple Alliance undertaking, is credited to Nezahualcoyotl of Texcoco alone by the Acolhua historian Ixtlilxochitl. In this account, Nezahualcoyotl, Itzcoatl and Totoquihautzin pursued joint campaigns in various areas (like Morelos), although individual city-states were conquered by only one of the three armies. Thus in the Morelos campaign, Nezahualcoyotl is described as conquering Cuauhnáhuac, while Itzcoatl conquered Tepoztlan and Huaxtepec:

> fueron sobre la tierra de los tlalhuicas y la ganaron, y haciendo la repartición conforme atrás queda referido, cupieron a Nezahualcoyotzin con la cabecera de Quauhnáhuac nueve pueblos. Al que puso por mayordomo de la cobranza de los tributos. . . . Al rey de México cupo lo de Tepoztlan, Huaxtepec y otros con la misma cantidad de tributos; y al de Tlacopan la parte que le pertenecía (Ixtlilxochitl 1975, II:106f).

In another passage Ixtlilxochitl (1975, I:446f) merely lists 44 towns and

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provinces conquered by Nezahualcoyotl, and then adds a note that in many of these he was accompanied by Itzcoatl and Totoquihuatzin and that they divided the tribute among them. This list includes Cuauhnáhuac, Yauhtepec and "Tlalhuic" (this latter term is sometimes used in the historical sources as a synonym for Cuauhnáhuac, but is most commonly used to refer to the whole area of Morelos included in Cortés' land, the "Marquesado"--see note 6).

Table 7 summarizes the evidence for conquests by Itzcoatl and Nezahualcoyotl in Morelos. The Mexica sources concur in attributing Cuauhnáhuac, Xiuhtepec, Huitzillapan and Ixtepec to the Mexica tlatoani. The latter three towns are all in the vicinity of Cuauhnáhuac, and were probably subjected during the Cuauhnáhuac campaign; their presence in the lists indicates that these city-states were independent of Cuauhnáhuac at the time of conquest. Ixtlilxochitl attributes Huaxtepec and Tepoztlan to Itzcoatl, but this is probably a confusion with later conquests of Moctezuma Ilhuicamina, who was the first to conquer these towns according to Mexica sources (see Table 7).

The statement of Ixtlilxochitl (1975, II:106) quoted above that Nezahualcoyotl conquered "con la cabecera de Quauhnáhuac nueve pueblos" is important for reconstruction of the Cuauhnáhuac polity at that time. Ixtlilxochitl in another passage (1975, I:446) lists Cuauhnáhuac, Tlalhuic and Yauhtepec as Nezahualcoyotl's Morelos victories. Because "Tlalhuic" may sometimes be used in the historical sources as a synonym for the Cuauhnáhuac province[6], it is reasonable to assume that the nine (unnamed) subject towns in fact comprised the Cuauhnáhuac province at the time of this conquest. Six of these nine towns are probably those represented in

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TABLE 7

CONQUESTS IN MORELOS BY ITZCOATL, NEZAHUALCOYOTL, AND MOCTEZUMA ILHUICAMINA

	Mexica Sources					Acolhua Sources	
	Anales de Cuauhtitlan 1975:66f	Leyenda de los Soles 1975:128	Nazareo et al. 1941:118f	Códice Mendoza 1980: 6r-8r	Chimalpahin 1965: 99, 195	Ixtlilxochitl 1975, I:446	Ixtlilxochitl 1975, II:107
Itzcoatl Conquests							
CUAUHNAHUAC[a]	x	x	x	x	x	-	-
Xiuhtepec	x	x	x	x	-	-	-
Huitzillapan	x	x	x	x	-	-	-
Ixtepec	-	x	x	x	-	-	-
HUAXTEPEC	-	-	-	-	-	-	(x)
TEPOZTLAN	-	-	-	-	-	-	(x)
Nezahualcoyotl Conquests							
CUAUHNAHUAC	-	-	-	-	-	x	x
YAUHTEPEC	-	-	-	-	-	x	-
Tlalhuic	-	-	-	-	-	x	-
Moctezuma Ilhuicamina Conquests							
CUAUHNAHUAC	x	x	x	x	x	-	-
Xiuhtepec	x	x	x	x	-	-	-
Coatlan	-	x	-	-	-	-	-
HUAXTEPEC	x	x	x	x	-	-	-
YAUHTEPEC	x	x	x	x	-	-	-
YACAPICHTLAN	x	x	x	x	-	-	-
Tecpantzingo	-	-	-	x	-	-	-
TOTOLAPAN	x	x	x	x	-	-	-
Atlatlauhcan	x	x	x	x	-	-	-
TEPOZTLAN	-	x	-	x	-	-	-

[a]Towns written in capital letters were province capitals in 1519; subject towns are listed below their respective capital (based on Gerhard 1970).

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a list of seven Morelos towns subject to Texcoco. This list, which includes Cuauhnáhuac, Miacatlan, Mazatepec, Atlpoyecan, Zacatepec, Tlaquiltenango, and Ollintepec, is recounted in two sources (Anales de Cuauhtitlan 1975:64 and Motolinía 1970:396), and almost certainly pertains to the early to mid fifteenth century period considered here rather than to 1519. Lists of subject towns, in contrast to conquest lists, tend to include province capitals and city-state capitals together, without distinction (see above). Thus the dating of this list to the period for which Ixtlilxochitl reveals the existence of a province centered on Cuauhnáhuac suggests the interpretation of this list as a description of (at least part of) that province.

The argument for an early fifteenth century dating of the Texcoco subject list is developed by Gibson (1971:384f), who shows that much territory (including Morelos) conquered in early Triple Alliance campaigns by Nezahualcoyotl subsequently changed from Texcoca jurisdiction (and tribute) to either Tenochtitlan or Triple Alliance control. Thus a late list of Texcoco subjects (Anonymous 1960) contains no Morelos towns, while other late lists of territorial jurisdiction have Cuauhnáhuac subject specifically to the whole Triple Alliance and not to Texcoco alone (Pintura de México 1975:382; Memorial de los Pueblos 1940:121--this is a separate list in the same source as the Tepanec empire list discussed above). Ixtlilxochitl (1975, I:459f) states that in 1519 Cuauhnáhuac was subject to both Texcoco and Tenochtitlan, and by this date the only Acolhua claims on Morelos territory left from the earlier period were private lands controlled by Acolhua nobles in certain Morelos towns (Pimentel Nezahualcoyotl 1960:172). Following this interpretation of the dating of the

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Texcoco tributary list, the structure of the Cuauhnáhuac province in 1438 is shown in Figure 5. It may be observed that Cuauhnáhuac had by this time expanded to cover all of the territory previously included in the Tepanec empire in western Morelos.

Barlow reports in two articles that at the death of Itzcoatl, the city-states of Morelos and adjacent northeastern Guerrero rebelled against the Triple Alliance, presumably by withholding their tribute payments (Barlow 1947:217f; 1948a:185). The only citation given by Barlow is a reference in the first article to unpublished documents; however, some sort of rebellion or act of defiance seems likely, since Moctezuma Ilhuicamina (the following Mexica tlatoani) had to reconquer virtually the entire area of Morelos. As shown in Table 7, six of the seven province capitals of 1519 were conquered by Moctezuma during his reign from 1440 to 1468. Sahagún (1950-69, bk.8:1), who tends to list only the more significant wars of conquest of each Mexica tlatoani, includes Cuauhnáhuac in his discussion of Moctezuma's victories. The only date available for these Morelos conquests is given by Chimalpahin (1965:99), who places them in 12 Tecpatl = 1452; this falls in the middle of the period of famine in the Basin of Mexico which lasted from 1450 to 1454 (see Davies 1973a:91-94). After Moctezuma's campaign in Morelos, there are only sporadic mentions of Triple Alliance conquests in the area.

The list of Moctezuma Ilhuicamina conquests of Morelos implies that by 1452, Huitzillapan and Ixtepec had become Cuauhnáhuac subjects, while Xiuhtepec and Coatlan were still independent of the Cuauhnáhuac province (see Table 7). The remainder of the Morelos towns conquered by Moctezuma are indicated in Figure 5 as independent city-states (some were probably

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Figure 5. Morelos territorial organization in the period, 1438-1452. (Independent polities of 1438 are underlined).

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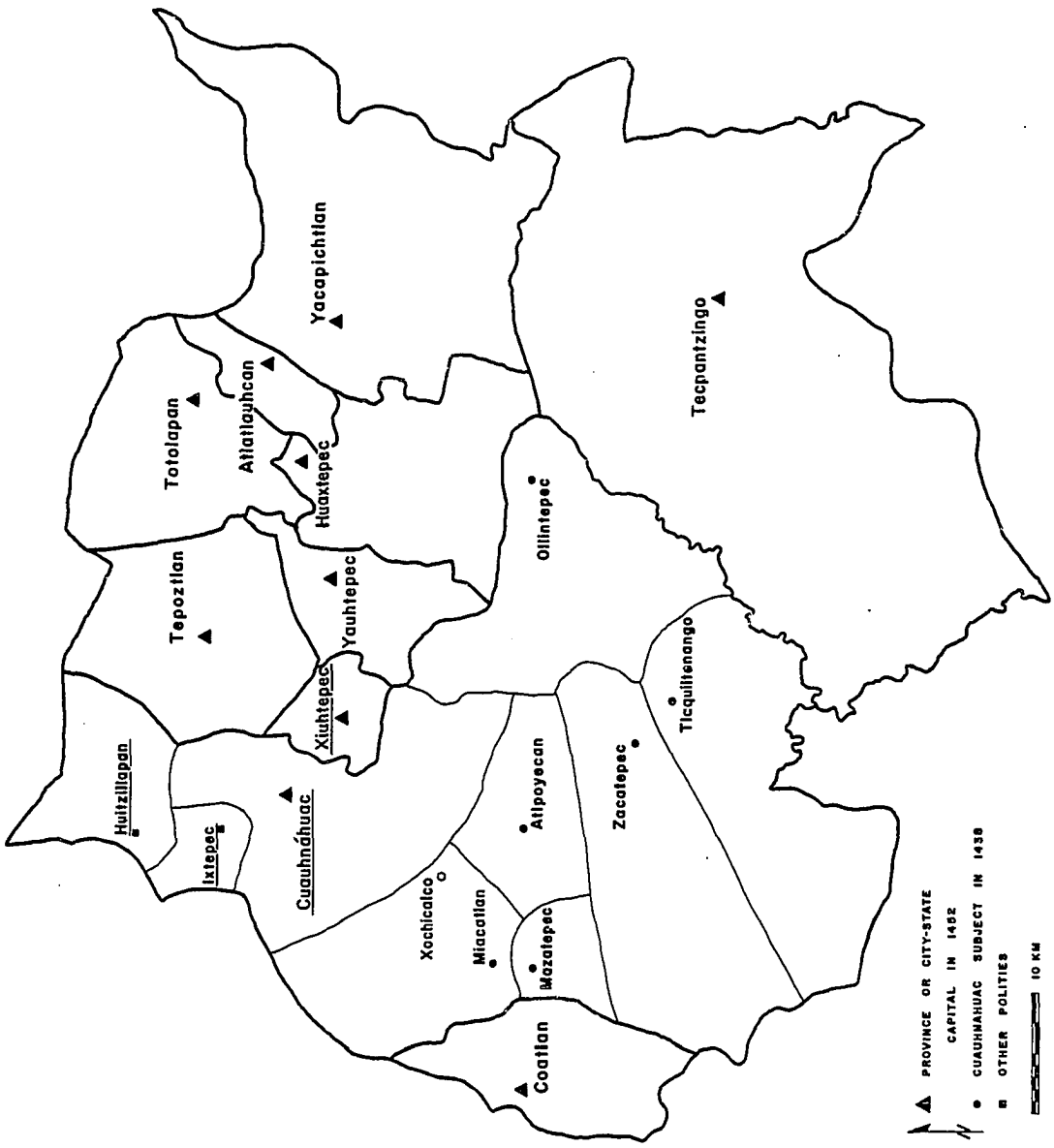

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small provinces controlling other city-states). Information on the city-state (province?) of Coatlan is contained in the still unanalyzed Mapa de Coatlan del Rio (Biblotheque National de Paris, no. 102; Glass 1975:109, no. 65), an indigenous pictorial manuscript showing Coatlan in the center and surrounding towns along the edges. Preliminary study (Barlow 1976b:86; Mason 1980:6) indicates that the polities bordering Coatlan were Malinalco, Zumpahuacan and Tonatico to the northwest, Pilcaya, Teticpac, Tlachco, and Acamixtlahuaca to the southwest and south, and Cuauhnáhuac (province) to the east and northeast. Barlow (1976b:86) dates the document to ca. 1550 and shows that the ruling lineage depicted for Coatlan extends back three or four centuries from that date. The territorial extent of Coatlan indicated in the map probably pertains to the period under consideration here, because during the prior Tepanec period, Cuauhnáhuac did not border Coatlan, and in the succeeding final Prehispanic years, Coatlan is listed as merely another subject of Cuauhnáhuac and not as an independent polity as implied by the map. If Coatlan had maintained its independence from the Cuauhnáhuac province until 1519 (in spite of inclusion in the Cuauhnáhuac Triple Alliance province--see below), then its subsequent inclusion in the Cuernavaca encomienda (see below) would probably have been challenged early in the sixteenth century.

Morelos and the Basin of Mexico, 1460-1519

Although already conquered twice by the Triple Alliance, Cuauhnáhuac must have rebelled or stopped tribute payments again during the reign of Axayacatl (1468-1481), because the sources speak of a final and definitive conquest of the Morelos province in 10 Tecpatl = 1476. Chimalpahin (1965:

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105) puts it as follows: "en esto año se sometió, certificadamente, a la gente de Cuauhnáhuac." He mentions this conquest immediately after describing a Triple Alliance victory of Ocuillan, as does the Anales de Cuauhtitlan (1975:56). Durán, while not mentioning the Triple Alliance conquests of these two polities, describes an Ocuiltecan victory over Cuauhnáhuac as part of a rash of revolts and wars during Axayacatl's reign:

> En tiempo de este rey Axayacatl hubo grandes revueltas entre las naciones cercanas, especialmente una reñida guerra y enmistad que hubo entre los de Ocuila y Cuauhnáhuac, saliendo vencedores los de Ocuila (Durán 1967, II:293).

This loss to Ocuilan and the final conquest by the Triple Alliance (which probably followed the local war) mark the end of references in the historical sources to Cuauhnáhuac as a strong and independent polity in central Mexico. Several years later in 1483, Cuauhnáhuac forces were "destroyed" in a battle at Atlixco against the armies of Huexotzingo (Anales de Cuauhtitlan 1975:57; Ixtlilxochitl 1975, II:154). This may have been a "flowery war" as Muller (1949:39) suggests, since it is difficult to imagine why else these two polities would engage in battle at Atlixco. In the year of dedication of the Templo Mayor of Tenochtitlan (8 Acatl = 1487), the Códice Aubin reports that "nuevamente se pusieron señores en los cuatro pueblos: Quauhnahuac, Tepoztlan, Huaxtepec, Xilloxochitepec" (1963:74). The phrase "se pusieron" implies that new leaders were imposed upon these Morelos towns, presumably by the Triple Alliance, which is another indication of the decline of Cuauhnáhuac and other Morelos polities in the decades prior to 1519. The toponym Yauhtepec appears in a list of the conquests of Ahuitzotl (Anales de Tlatelolco 1948: 17), but the context of the town suggests that it is <u>not</u> the place of that

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name in Morelos. Finally, the Códice Mendoza (1980:16r) lists Hueyapan as a conquest of Moctezuma Xocoyotzin; this is the only mention of a conquest in the northeastern portion of Morelos which comprised the Ocuituco province in 1519.

The loss of independent power and strength suffered by Cuauhnáhuac and other Morelos polities from 1438 onwards was accompanied by their increased integration into the activities of the Mexica state. Part of the elaborate Mexica system of state-sponsored public rituals involved the invitation of leaders of other polities to participate in certain key celebrations. Leaders of allied, subject, and even enemy polities attended these rituals, which included coronations, state funerals, and major temple dedications (see Davies 1973a). In addition, subject areas were required to contribute soldiers for Triple Alliance military campaigns and send workers for large scale construction projects in Tenochtitlan (Davies 1973a). While information on the specific areas participating in these two general classes of Mexica state activities is found in a number of sources (e.g. Ixtlilxochitl 1975; Tezozomoc 1975a), Durán (1967, II) provides the most consistent accounts.

Basin of Mexico groups allied with Tenochtitlan--the Acolhua and Tepanecs--participated in all of the more than 30 such Mexica state activities listed in Durán. Of the non-Basin of Mexico groups listed as participating, those from Morelos participated far more often than did any other groups. As Table 8 shows, Morelos representatives are listed for 26 activities, while the next three highest groups--Matlatzinca, Mazahua, and Cuauhtlapaneca--participated in 9, 8, and 11 activities respectively. While Durán's list is not complete (e.g. Morelos leaders also

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TABLE 8

PARTICIPATION OF NON-BASIN OF MEXICO GROUPS IN MEXICA STATE ACTIVITIES, CA. 1460-1519 (FROM DURÁN 1967)

	Category of Activity	No. of activities participated in by groups from:			
		Morelos	Matlatzinco	Mazahuacan	Cuauhtlalpan
A.	Coronations	3	2	1	2
B.	Funerals	2	-	-	-
C.	Other state rituals	4	2	2	1
D.	Military campaigns	7	3	1	5
E.	Tenochtitlan construction projects	3	1	1	1
F.	Other activities	7	2	3	2
	TOTAL	26	9	8	11

Listing of Activities and Citations (page numbers refer to Durán 1967,II)

A. Coronations: Tizoc, initial ceremony (301); Tizoc, second ceremony (306); Moctezuma Xocoyotzin (415).

B. Funerals: Ahuitzotl (393); Nezahualpilli (474).

C. Other state rituals: Tlacaxipehualiztli (gladiator sacrifice) inauguration (172); Cuauhxicalli inauguration (192); Templo Mayor dedication (333-341); Coatecalli temple dedication (442).

D. Military campaigns: Oaxaca (231); Tlaxcala (237); Michoacan (281-285); Metztitlan (303); Chiapas (319); Xoconochco (384-387); Cholula (448).

E. Tenochtitlan construction projects: Templo Mayor (227); Coyoacan-Tenochtitlan aqueduct (373); reconstruction after flood (380).

F. Other activities: Colonization of Oaxaca (238); colonization of Oztoman (352); trade with Tehuantepec (357); received news of conquest of Tehuantepec (361); participation in victory celebration (362); participation in council to elect Moctezuma Xocoyotzin (397); received request for information on Huexotzinca spies (464).

attended Tizoc's funeral and Ahuitzotl's coronation (Tezozomoc 1975a:455, 494), the higher level of participation it shows for Morelos groups in Basin of Mexico activities compared to other groups is striking, and points to a closer integration into the Basin of Mexico society for Morelos than for any other area of central Mexico. The 26 activities attended by Morelos groups were spread over the reigns of the final five Mexica tlatoque in the following frequencies: Moctezuma Ilhuicamina (5); Axayacatl (2); Tizoc (3), Ahuitzotl (10); and Moctezuma Xocoyotzin (6).

There are several lines of evidence which suggest that in the Mexica geopolitical cosmology, Morelos was regarded as a part of the Triple Alliance core area, almost as an extension of the Basin of Mexico; the high level of Morelos participation in Mexica state activities is a reflection of this conceptualization. In Durán's description of the inauguration of a new sacrificial stone (the cuauhxicalli) by Moctezuma Ilhuīcamina, he states, "mandó el rey Huehue Moctezuma que fuesen convidados todos los señores de la provincia" (Durán 1967, II:192; emphasis added). Specifically invited to this ceremony were the leaders of six Basin of Mexico polities (Texcoco, Tlacopan, Chalco, Xochimilco, Culhuacan and Cuitlahuac) plus leaders from Morelos (referred to here as the "Marquesado"). This grouping of Morelos with the Basin of Mexico, referred to by Durán as "la provincia," also emerges from Broda's (1978) analysis of warrior costume tribute in the Códice Mendoza.

Broda (1978:130) points out that the order of listing of the 38 Triple Alliance tributary provinces in the main tribute lists (Códice Mendoza 1980; Matrícula de Tributos 1964) corresponds to a geographical division into five areas. The first five provinces constitute the

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geographical center, while succeeding provinces make up the north (nos. 6-10), west (11-18), south (19-30), and east (31-38) groups. Broda (1978:130f) shows that these five groups were differentiated by the number, types, and variety of types of warrior costume tribute paid to the Triple Alliance as well as by other kinds of tribute goods. The positions of Cuauhnáhuac and Huaxtepec as the fourth and fifth provinces in the tribute lists shows that Morelos was regarded as part of the center or core of the Triple Alliance empire. Broda describes this geographical division as follows:

> El análisis de los tributos en trajes y rodelas da una división del imperio mexica en cinco grandes regiones correspondientes a los rumbos centro - norte - oeste - sur - este. La Matrícula y el Mendocino enumeran las provincias en este orden, que debe considerarse como el sistema indígena de agruparlas. Es de notar que esta ordenación va en dirección contraria a las agujas del reloj, de acuerdo con la costumbre prehispánica . . . las cinco grandes unidades territoriales tenían connotaciones de tipo cosmológico basadas en la concepción de los cuatro puntos cardinales más el centro como quinta dirección (Broda 1978:132,133).

In this scheme, then, Morelos was cosmologically and economically (at least in terms of the nature of tribute) part of the core rather than the periphery of the Triple Alliance empire.

The close integration of Morelos into the Basin of Mexico socio-economic system is reflected in some of the events mentioned in the historical sources for this final Prehispanic period. Moctezuma Ilhuicamina started construction of his famous botanical garden at Huaxtepec soon after he conquered Morelos (Durán 1967, II:247); similarly, Cuauhnáhuac and Yauhtepec contributed laborers to work in Nezahualcoyotl's gardens in the Texcoco area (Ixtlilxochitl 1975, II:114). When Axayacatl was arbitrating a boundary dispute between the polities of Tepeaca and

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Cuauhtinchan in Puebla, he called upon the Cuauhnáhuac tlatoani Tehuelhueltzin to help measure the border between the two city-states (Cuauhtinchan contra Tepeaca 1977:68). In 11 Tochtli = 1490, a new temple was dedicated in Cuauhnáhuac, probably to celebrate the inauguration of a new tlatoani (see below). To help in the rituals of dedication, Ahuitzotl sent 40 captives from Tenochtitlan to sacrifice at the ceremony (Anales de Cuauhtitlan 1975:58). A stone plaque with Ahuitzotl's name glyph was found together with a date glyph of 10 Tochtli (=1502, the year of Ahuitzotl's death) in the Tepozteco pyramid above Tepoztlan (Seler 1904: 347). This has been taken by most authorities (e.g. Noguera 1946:6; Riley 1973:5) to signal the initial construction or dedication of this pyramid by Ahuitzotl. However, archaeological evidence establishes that the pyramid was constructed from 200 to 400 years prior to 1502 (see Chapter 7 below and Smith n.d.). The Ahuitzotl glyph probably commemorates a special ceremony at the temple, perhaps a rebuilding of the structure. Another indication of the close ties between Morelos and the Basin of Mexico in the final period is that Basin of Mexico nobles, including Moctezuma Xocoyotzin, held private land (pillalli) in Morelos (Mayorga 1914:47; Pimentel Nezahualcoyotl 1960:172; see also Gibson 1964:264). A final line of evidence for these close ties consists of various accounts of people from the Basin of Mexico settling in Morelos. The Anales de Tlatelolco (1948:59) report that in 11 Tecpatl = 1464, a contingent of the Chalca moved to Cuauhtla after their defeat by the Mexica. An early sixteenth century Náhuatl census from Molotla, Morelos reports that the "grandfathers" (icolhuan) of 20 families (out of a total of 126 families listed) came from "Mexico" (Carrasco 1976:46).

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Most of the dated references to Morelos in the final 30 years before the arrival of Cortés concern political succession in the office of the Cuauhnáhuac tlatoani. In an attempt to put these data in perspective, all references to Cuauhnáhuac tlatoque from 1350 to 1519 are assembled in Table 9. The first entry is based on the statement of Chimalpahin that the Cuauhnáhuac ruling dynasty began in 3 Tecpatl: "Esto año dio comienzo el gobierno de nobles en Cuauhnáhuac. El que fue instalado para gobernir fue el de nombre Tehuehueltzintecuhtli" (Chimalpahin 1965:83). Chimalpahin equates 3 Tecpatl with 1404, but since the Tenochtitlan-Cuauhnáhuac marriage allaince involving Tezcacohuatzin occurred during the 1390's (see above), the Cuauhnáhuac dynasty must have started before that time. I have therefore subtracted one calendar cycle from 1404 to arrive at a date of 1352 for the start of the Cuauhnáhuac dynasty. The next tlatoani to be mentioned is Tezcacohuatzin, who gave his daughter in marriage to Huitzilihuitl of Tenochtitlan in the 1390's. According to Nazareo et al. (1940:122; see Figure 4), Tezcacohuatzin's son Cuauhtotzin followed him as tlatoani in Cuauhnáhuac. As both uncle and father-in-law to Moctezuma Ilhuicamina (1398-1468), Cuauhtotzin probably ruled during the 1420's. He may be the same person called Tlaltecuhtzin in the Anales de Tlatelolco (1948:23) who as Cuauhnáhuac tlatoani married the elder sister of Acolmiztli of Tlatelolco; Acolmiztli reigned from 1407-1426. The statement in the Anales de Tlatelolco (1948:22) that Tezozomoc's son Moquiuix was imposed as ruler in Cuauhnáhuac pertains to this same period, since we know that Teyolcocouatzin, installed in Acolman at the same time, was in power at the time of Tezozomoc's death in 1426 (Ixtlilxochitl 1975, II:352). The fact that Tezcacohuatzin is mentioned in a number of sources but Moquiuix is listed

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TABLE 9

CUAUHNAHUAC TLATOQUE

Dates	Ruler	Comment	Citation
1515-1521(?)	Yaocuixtli	tlatoani at Spanish arrival	see text
1512-1515	(no ruler)	--	see text
1504-1512	Itzcohuatzin	--	see text
1491-1504	Tehuelhueltzin	inauguration ceremony with sacrifices	see text
ca. 1470	Tehuelhueltzin	measured boundary in Puebla	Cuauhtinchan vs. Tepeaca 1977:68
1420's (?)	Cuauhtototzin (=Tlaltecuhtzin?)	son of Tezcacohuatzin	Nazareo et al. 1941:122
1390's	Tezcacohuatzin	father of Miahuaxihuitl	see text
1352(?)	Tehuehueltzintecuhtli	start of Cuauhnáhuac dynasty	Chimalpahin 1965:83

in only the one passage cited casts doubt upon the historicity of the latter's reign in Cuauhnáhuac.

The next direct reference to a Cuauhnáhuac tlatoani is to the Tehuehueltzin who measured the Cuauhtinchan-Tepeaca border at the request of Axayacatl (r. 1468-1481). Then in 12 Acatl = 1491, another Tehuehueltzin succeeded to the throne in Cuauhnáhuac: "fue installado el Tehuehueltzin como señor de Cuauhnáhuac, y se refiere que con este motivo hubo victimas propiciatorias en la casa del diablo en Cuauhnáhuac" (Chimalpahin 1965:224). This reference to human sacrifice at the ceremony may correlate with the statement in the Anales de Cuauhtitlan (1975:58) that in 11 Tochtli = 1490, Ahuitzotl sent the 40 captives to dedicate "el templo de los Cuauhnahuacas." Tehuehueltzin died in 1504 and was succeeded by Itzcohuatzin (Chimalpahin 1965:228; Anales de Cuauhtitlan 1975:59; Ixtlilxochitl 1975, II:179). At the latter's death in 1512, Cuauhnáhuac was left without a tlatoani for three years, following which time Yaocuixtli was crowned (Chimalpahin 1965:232; Anales de Cuauhtitlan 1975:61); when Cortés conquered Cuauhnáhuac in 1521, Yaocuixtli was the tlatoani (Anales de Cuauhtitlan 1975:63; Ixtlilxochitl 1975, II:252). While it has been asserted that these final three Cuauhnáhuac tlatoque were appointed and imposed by Moctezuma (Riley 1973:6), the only indication in the sources that this may have been the case is the three year period without a leader from 1512 to 1515. The causes or implications of this long interregnum are not mentioned in the sources, and there is nothing in the descriptions of the various leaders and their accessions to suggest that they were imposed by the Mexica.

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Morelos Territorial Organization in 1519

Territorial organization in Morelos in 1519 has been reconstructed in some detail by Gerhard (1970a; see also 1975), based on the study of both published and unpublished archival documents. Sources utilized in the present analysis but not consulted by Gerhard support his general scheme while providing additional information on regional variations of territorial organization within Morelos. Gerhard (1970a) divides the Morelos area into seven units, which he calls "states" or "kingdoms," comprised of 57 smaller entities which he calls "small states" or "chiefdoms." In the terminology followed here, the seven larger units are provinces while the smaller constituent units are city-states. Six of the provinces represent consolidations of the ten polities conquered in 1452 by Moctezuma Ilhuicamina, while the seventh (Ocuituco) does not appear in Triple Alliance conquest lists (with the exception of one mention of a conquest of Hueyapan) or tribute documents.

Gerhard's map of territorial organization in 1519 Morelos (1970a: 29) is based on the following kinds of evidence: "tribute records of the Mexica empire, communal and other land titles, lawsuits, contemporary geographical descriptions, and congregation reports" (Gerhard 1970a:28). Gerhard's primary emphasis in his reconstruction is upon the delimitation of political units--city-states and provinces--in space. This focus upon borders between adjacent polities overshadows the issue of reconstructing the composition of the provinces of Morelos by determining which settlements were city-state capitals and which were only dependent settlements without tlatoque. For this latter problem, Gerhard's analysis is superficial and

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the issue needs reconsideration. In all cases but Cuauhnáhuac and Ocuituco, Gerhard lists only those towns mentioned in the tribute portion of the Códice Mendoza (1980) under the Triple Alliance tributary provinces of Cuauhnáhuac and Huaxtepec. For Cuauhnáhuac, several additional towns are included, while the Ocuituco province, not represented in the Mendoza, is reconstructed from other sources. While Gerhard makes haphazard use of a 1532 list of Cortés' encomiendas in Morelos (Cortés 1869:560f), I believe that a more consistent utilization of this source yields a better picture of the city-states of Morelos in 1519.

Reliance on the 1532 encomienda list is justified by the fact that the geographical extent of early encomiendas was usually determined by pre-existing native territorial structures. Gibson summarizes the situation as follows:

> Despite exceptions, a one-to-one relation between tlatoani community and encomienda was surely regarded as a norm. Following the practice of the West Indies, encomienda grants in Mexico were originally expressed as assignments of Indian señores with their followers rather than of designated towns with their inhabitants (Gibson 1964:65).
>
> Though the documents refer to the "señor and his Indian peoples," encomiendas were customarily identified by their cabeceras, and in all cases the sujetos of the cabeceras were assumed--by the encomenderos, by rival encomenderos, and by the courts--to be contained within the grant (Gibson 1964:72).

In Morelos, this practice led to the definition of encomiendas in terms of provinces and not city-states, as was generally the case in the Basin of Mexico analyzed by Gibson. Such a difference in level fits our knowledge of Postclassic Morelos, where the city-states were smaller than those of the Basin of Mexico. The 69 Morelos city-states covered an area of approximately 5000 square kilometers, while the 50 or so Basin of Mexico city-states covered some 7260 square kilometers; thus the average

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area of a city-state in Morelos (72.5 km. sq.) was half the corresponding figure for the Basin of Mexico (145 km. sq.). The Morelos provinces cannot be classified as large city-states, however, because they included polities with tlatoque (Gerhard 1970a:36; Carrasco 1968:375), i.e. constituent city-states. Thus the mapping of early encomiendas onto the indigenous provinces of Morelos makes perfect sense in terms of general central Mexican practice.

My reconstruction of the city-states of Morelos in 1519 is summarized in Table 10 and presented graphically in Figure 6. While Gerhard (1970a:33) is almost certainly correct in observing that not all of the 62 towns in the 1532 encomienda list correspond to separate city-states of 1519, I believe that he underestimates the number which do. In addition to the 35 of these Gerhard includes in his totals, I add eleven more. My procedure starts with the 31 towns listed in both the 1532 list (Cortés 1869:560f) and the Códice Mendoza (1980); these are shown in Table 10. Then, of the remaining towns in the 1532 list but <u>not</u> in the Códice Mendoza, I omit all which are not verified in some independent sixteenth century source as having a status <u>above</u> that of a barrio or estancia.[7] The remaining 15 towns with independent verification are added to the list, as are the 11 towns mentioned in the Códice Mendoza but <u>not</u> in the 1532 list; finally one additional town (Cohuintepec) is added to the Cuauhnáhuac province based on a document cited by Gerhard (1980a:33). My reconstruction is identical to Gerhard's for Huaxtepec, Yauhtepec, Tepoztlan and Totolapan, while my method adds five towns to the Yacapichtlan province and six to Cuauhnáhuac. The validity of adding these eleven towns to Gerhard's original list of 57 city-states is shown by the fact that at least one of the

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TABLE 10

RECONSTRUCTION OF MORELOS PROVINCES AND CITY-STATES IN 1519

Provinces and City-States	Sources				Modern Town
	Mendoza	1532	Indepen.	Gerhard	
1. CUAUHNAHUAC	x	x	x	x	Cuernavaca
2. Acatlicpac	x	x	x	x	Acatlipa
3. Amacoztitlan	x	-	-	x	Amacuzac
4. Amatitlan	-	x	x	-	Amatitlan, Cuernavaca
5. Atlicholoayan	x	-	x	x	Atlacholoaya
6. Atlpoyecan	-	x	x	x	Alpuyeca
7. Coatlan	x	x	x	x	Coatlan del Rio
8. Cohuintepec	-	-	x	x	Cuentepec
9. Cuauhchichinola	-	x	x	-	Cuachichinola
10. Huitzillapan	x	-	-	x	Huitzilac
11. Ixtepec	x	-	-	x	Ahuacatitlan
12. Ixtlan	x	x	x	x	Puente de Ixtla
13. Mazatepec	-	x	x	x	(same)
14. Miacatlan	x	x	x	x	(same)
15. Molotlan	x	-	x	x	(unidentified; Tetelpa?)
16. Ocpayucan	x	x	x	x	(unidentified)
17. Panchimalco	x	-	-	x	(same)
18. Tehuixtlan	-	x	x	-	Tehuixtla
19. Temimilcingo	-	x	x	-	(same)
20. Teocalcingo	x	x	x	x	Teocalcingo, Gro.
21. Tequesquitengo	-	x	x	-	(same)
22. Tezoyucan	-	x	x	-	Tezoyuca
23. Tlaquiltenango	-	x	x	x	(same)
24. Xiuhtepec	x	x	x	x	Jiutepec
25. Xochitepec	x	x	x	x	(same)
26. Xoxotlan	x	x	x	x	Jojutla
27. Zacatepec	-	x	x	x	(same)

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TABLE 10 (continued)

Provinces and City-States	Sources				Modern Town
	Mendoza	1532	Indepen.	Gerhard	
28. HUAXTEPEC	x	x	x	x	Oaxtepec
29. Ahuehuepan	x	x	x	x	(none)
30. Amilcingo	x	-	-	-	(same)
31. Anenecuilco	x	x	x	x	(same)
32. Cuauhtlan	x	x	x	x	Cuautla
33. Cuauhtlixco	x	x	x	x	Cuautlixco
34. Ixtamatitlan	x	x	-	x	Itztamatitlan
35. Ollintepec	x	x	x	x	Olintepec
36. Xochimilcatzingo	x	x	x	x	(unidentified)
37. Zumpango	x	x	-	x	(unidentified)
38. YAUHTEPEC	x	x	-	x	Yautepec
39. Atlhuelican	x	x	-	x	Atlihuayan
40. Coacalco	x	-	-	x	Oacalco
41. Huitzillan	x	x	x	x	Huitzililla
42. Tlaltizapan	x	x	-	x	(same)
43. YACAPICHTLAN	x	x	x	x	Yecapixtla
44. Amayucan	-	x	x	-	Amayuca
45. Atotonilco	-	x	x	-	(same)
46. Axochiapan	x	x	x	x	(same)
47. Tecpantzingo	x	x	x	x	Tepalcingo
48. Tetellan	-	x	x	-	Tetelilla
49. Tleyacac	x	x	x	x	(same)
50. Xantetelco	-	x	x	-	Jantetelco
51. Xoloztoc	x	x	x	x	(same)
52. Xonacatepec	-	x	x	-	Jonacatepec
53. TEPOZTLAN	x	x	x	x	(same)

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TABLE 10 (continued)

Provinces and City-States	Sources				Modern Town
	Mendoza	1532	Indepen.	Gerhard	
54. TOTOLAPAN	x	x	x	x	(same)
55. Atlatlauhcan	x	x	x	x	(same)
56. Nepopoalco	x	-	-	x	(same)
57. Tehuixco	x	-	-	x	(unidentified)
58. Tlayacapan	x	-	x	x	(same)
59. OCUITUCO	-	-	x	x	(same)
60. Acatzingo	-	-	x	x	Ecatzingo, Mex.
61. Hueyapan	-	-	x	x	(same)
62. Nepopoalco	-	-	x	x	(unidentified; Huejotengo?)
63. Tetellan	-	-	x	x	Tetela del Volcan
64. Xumiltepec	-	-	x	x	Jumiltepec
(southern group)					
65. Cuauhzolco	-	-	x	x	Huazulco
66. Temoac	-	-	x	x	(same)
67. Tlacotepec	-	-	x	x	(same)
68. Zacualpan	-	-	x	x	(same)

Note: Province capitals are capitalized.

Citations:
Mendoza: Códice Mendoza 1980:23r, 24v, 25r.
1532: 1532 encomienda list; Cortés (1869:560f).
Independent: city-state confirmed independently; see note 7.
Gerhard: Gerhard 1970a.

Figure 6. Morelos territorial organization in 1519.

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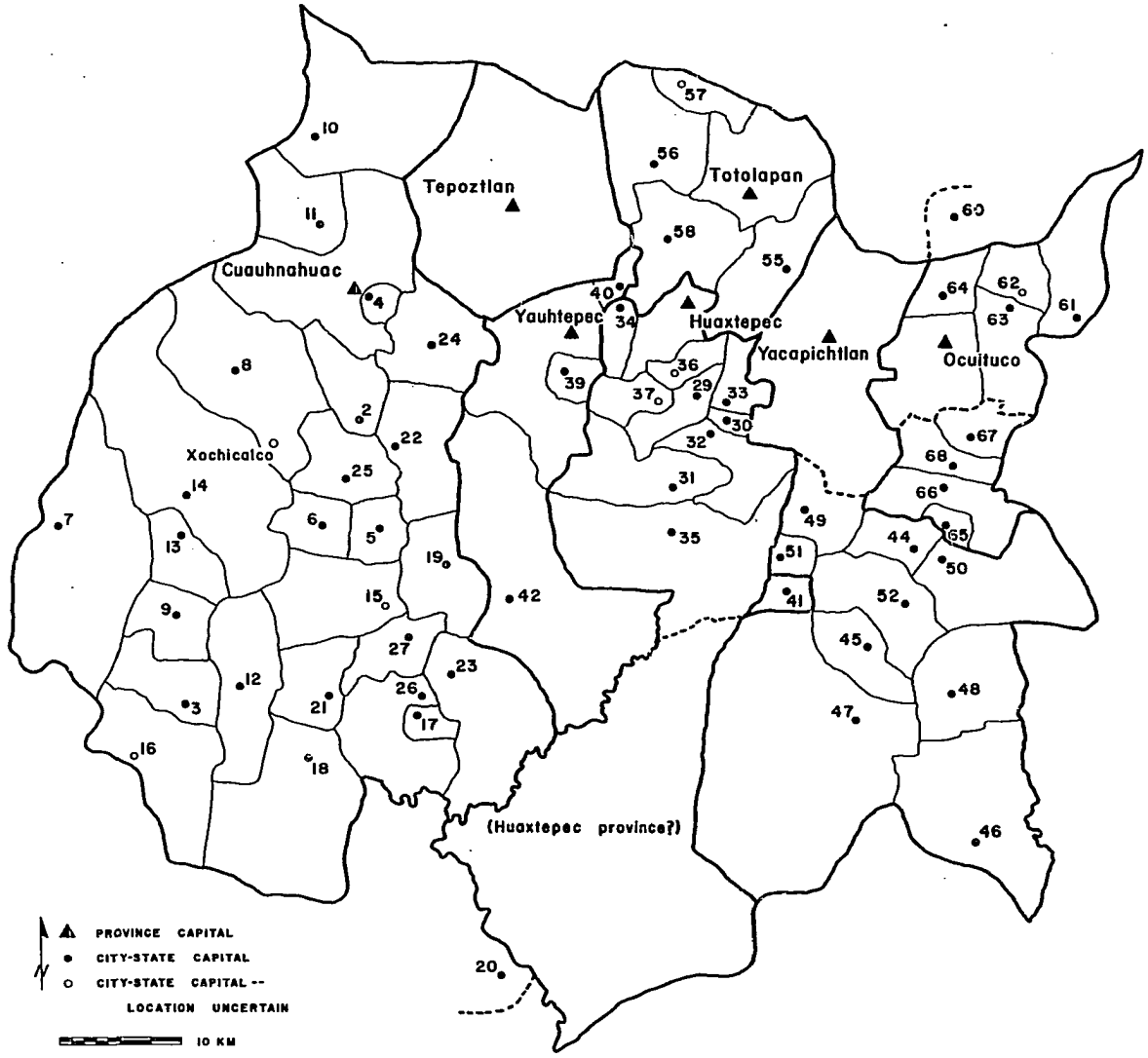

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additional towns--Cuauhchichinola--had a tlatoani at the time of the Spanish conquest (Carrasco 1968:375).

Before discussing the seven Morelos provinces individually, evidence for the importance of at least five of these polities prior to 1519 is considered. The five province capitals of Cuauhnáhuac, Huaxtepec, Yauhtepec, Yacapichtlan and Tepoztlan figure prominantly in lists of towns whose rulers attended various Basin of Mexico events between 1481 and 1519 (Table 11). These events are similar to those portrayed in Table 8, with the difference that Durán and Tezozomoc here list the names of specific Morelos towns sending their rulers instead of simply noting that nobles or other persons from Morelos attended the activities. The presence of the five province capitals in these lists and the absence of any of their 1519 subjects suggests that such previously independent city-states as Coatlan, Xiuhtepec, or Tecpantzingo were by this time incorporated into the larger provinces; I take this to infer that processes of political centralization and consolidation were taking place within the Morelos provinces between 1452 and 1519. This is hardly surprising given the general lack of Triple Alliance interference in local politics. In fact, the increased tribute exactions caused by the addition of the Triple Alliance as another level of payment may have contributed to the consolidation of power in the hands of the provincial rulers at the expense of the other city-states.

Cuauhnáhuac

This internal centralization proceeded within the Cuauhnáhuac province in spite of the polity's above-noted decline in power after 1438. In 1519, the province impressed Cortés and other early Spanish chroniclers

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TABLE 11

MORELOS TOWNS INVITED TO BASIN OF MEXICO EVENTS, 1481-1519

Towns	Events						
	A. 1481	B. 1481	C. 1486	D. 1486	E. 1487	F. 1519	G. 1519
Cuauhnáhuac	x	x	x	x	x	-	x
Huaxtepec	x	x	x	x	x	x	x
Yauhtepec	x	x	x	x	x	x	x
Yacapichtlan	x	x	x	x	x	-	x
Tepoztlan	x	-	x	-	-	x	x
Totolapan	-	-	-	-	x	-	x
Tlayacapan	-	-	-	-	x	-	x
Atlatlauhcan	-	-	-	-	x	-	-

Key to events and citations:

A. Axayacatl funeral (Durán 1967,II:296)

B. Tizoc coronation (Durán 1967,II:307; Tezozomoc 1975a:439)

C. Tizoc funeral (Tezozomoc 1975a:455)

D. Ahuitzotl coronation (Tezozomoc 1975a:494)

E. Templo Mayor dedication (Durán 1967,II:334, 341)

F. Moctezuma Xocoyotzin's call for wizards (Duran 1967,II:521)

G. Cuauhtemoc's call for aid against Cortés (Durán 1967,II:559)

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for its size, power and strongly-defended capital city. Some examples of their descriptions of the Cuauhnáhuac province are: "antiguamente era gran provincia, porque esta cabecera [Cuauhnáhuac] señoreaba muchos y buenos pueblos" (Informe de la Provincia del Santo Evangelio 1941:15); "Era quatlabaca lugar populoso y fuerte por naturaleza" (de Solís 1924, II:230); "Esta población es más fuerte que las demás, hasta en España" (Títulos de Cuernavaca 1947:222); "este fortisimo lugar" (Torquemada 1969, I:536). My only disagreement with Gerhard's brief but informative discussion of the Cuauhnáhuac province (1970a:33f) concerns the six towns--Amatitlan, Cuauhchichinola, Tehuixtlan, Temimilcingo, Tequesquitengo and Tezoyucan--which I add to his list of constituent city-states as a result of my emphasis on the 1532 encomienda list.

Huaxtepec

In addition to the town of Huaxtepec's role as central collection point of the Triple Alliance province of the same name, the town was capital of a smaller province consisting of 10 city-states. The Relación de Huaxtepec (1930:36) explicitly says that in addition to the Triple Alliance calpixque in Huaxtepec, "ellos tenían otro señor natural"; i.e. a tlatoani. The palace of this ruler, whose name in 1519 was Tizapapalotzin (Anales de Cuauhtitlan 1975:63), greatly impressed the Spanish troops who lodged there for a time during their campaign in Morelos: "Era el palacio un edificio tan suntuoso que pudiera competir con los de Motezuma; y de tanta capacidad que se alojaron dentro de el todos los Españoles con bastante desahogo" (de Solís 1924, II:229). de Solís commented that the town of Huaxtepec was a "lugar populoso" (p. 229). Only nine of the 21

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towns attributed to the Huaxtepec encomienda in 1532 appear to have been city-states; these towns are also listed in the Códice Mendoza and other sources, and most of them are classified as "pueblos" (as opposed to "estancias") in the Relación de Huaxtepec (1930:34-36). Amilcingo, listed in the Mendoza but not the 1532 list, is added as a city-state by Gerhard and myself. The other 12 towns in the 1532 list are either not mentioned in independent sources, or are classified as "estancias" in the Relación de Huaxtepec (1930:34-36).

Yauhtepec

As Gerhard (1970a:35) points out, little is known about the province of Yauhtepec, in large part because the Relación Geográfica has been lost. Of the six towns attributed to Yauhtepec in the 1532 encomienda list, only four are retained as city-states; however, it is very possible that additional documentary sources on Yauhtepec, if found, would indicate that Ticuman and Amatepec were also city-states in 1519. Coacalco, listed in the Códice Mendoza but not in the 1532 list, is also added as a city-state in the Yauhtepec province. The Huitzillan city-state was an enclave, lying beyond the Huaxtepec province to the east of Yauhtepec.

Yacapichtlan

The Yacapichtlan city-state is described in the Relación de Yacapichtlan (n.d.:225) as a moderately-sized entity comprising the approximate territory of the modern municipio of Yecapixtla and ruled by a "señor absoluto." The 1532 encomienda list includes in addition to

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Yacapichtlan itself nine towns located some distance to the south and together known as "Tlalnahuac" (see the Relación de Yacapichtlan n.d.: passim; Orozco y Berra 1964:251; Gerhard 1970a:39). Only the four of these listed in the Códice Mendoza are included in the Yacapichtlan province by Gerhard, while I consider all of the 1532 encomienda towns as city-states, based on independent sources (e.g. Vista, Tasación y Cuenta 1946:194-202; García Pimentel 1904:115; Relación de Xantetelco 1942; etc.). However, there is some question as to whether the Tlalnahua city-states were actually subject to Yacapichtlan or were independent city-states not part of any province (other than the Triple Alliance province of Huaxtepec); Gerhard (1970a:39; 1972:97f) discusses the early colonial legal battles over the status of these towns, and this question is best left open for the time being.

Tepoztlan

The Postclassic polity of Tepoztlan is more accurately described as a relatively large city-state than as a province, since there is no evidence that its dependent settlements were more than estancias of the central town. Information on territorial organization within the Tepoztlan city-state is fairly abundant, but contradictory (Relación de Tepoztlan 1905; Carrasco 1962, 1964; Lewis 1951:19-26).

Totolapan

Although the Relación de Totolapan (1905:9) claims that this province was ruled by "un señor unibersal," there is evidence that political centralization and consolidation within Totolapan was less developed than in the other Morelos provinces. For example, the three major

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constituent city-states (Totolapan, Tlayacapan, and Atlatlauhcan) tend to be listed together in the late historical sources, compared to the other provinces, whose capital alone is usually given (see Table 11). In a list of participants in the Triple Alliance campaign in Chiapas, Durán (1967, II:319) lists "tlahuicas . . . y los de Tlayacapan y Totolapan . . ." as the Morelos representatives. For the Templo Mayor dedication, Durán (p. 334) lists Atlatlauhcan as a province capital, but also lists Totolapan and Tlayacapan as subject city-states, suggesting that these two polities had more power than comparable city-states subject to the other Morelos province capitals. Cortés evidently tried to take advantage of the less centralized nature of the Totolapan province by claiming that these city-states had been part of the Yacapichtlan province, and thus should belong to Cortés' territorial grant in Morelos (Cortés 1869:560f; see Riley 1973:21 or Gerhard 1970a:37f). Cortés was not successful in his effort, and the Audiencia ruled that Totolapan and the other towns were independent of Yacapichtlan and did not belong in that encomienda (Audiencia de México 1939:211f; see Riley 1973:33). None of the other encomiendas in Morelos were challenged in this manner. Further evidence of the relative lack of political centralization in Totolapan is contained in Gerhard's discussion of early colonial lawsuits (1970a:37f; 1972:103-105).

Ocuituco

The province of Ocuituco occupied the northeastern corner of the present state of Morelos, and was in many respects separate from the other six provinces of Morelos. Hueyapan is the only city-state of Ocuituco mentioned in Triple Alliance conquest lists, and Durán (1967, II:334)

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states that in 1487 these city-states were subject to the province of Cuauhquechollan in the modern state of Puebla. Cuauhquechollan is in turn listed as part of the Tepeaca Triple Alliance province (Códice Mendoza 1980:42r). Ocuituco is thus the only province in Morelos whose city-states were not part of the Triple Alliance provinces of Cuauhnáhuac or Huaxtepec; similarly, this area was not included in Cortés' Morelos land grant (Cortés 1869:560f; Riley 1973). Gerhard (1970a:39f; 1970b) bases his reconstruction of the Ocuituco province on a 1531 visita (published in Gerhard 1970b), the Relación de Tetellan y Hueyapan (1905) and several other sources.

Summary

My reconstruction of Morelos territorial organization in 1519 agrees substantially with that of Gerhard (1970a), who bases his analysis on a far greater range of unpublished archival material than I have access to. My only modification in Gerhard's published scheme is the addition of 11 more city-states to the 1519 provinces of Morelos; this change results from my more consistent utilization of the 1532 encomienda list (Cortés 1869:560f) in conjunction with other sources. In addition to this relatively minor modification of Gerhard's analysis, material presented in this section provides a diachronic perspective on changes in Morelos territorial organization prior to 1519, identifying some of the processes that led to the territorial structure encountered by Cortés in 1519.

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Notes

[1]Several additional errors of scholarship by Davies on this matter may be mentioned. First, he incorrectly cites the Anales de Cuauhtitlan (no page given) for the 6 Acatl = 1407 conquest of Yacapichtlan (Davies 1980:226); the correct citation is Chimalpahin 1965:83. Second, he gives "Capisela" (p. 226) instead of "Capiscla" which is the form found in the original source (Historia de los Mexicanos 1941:229).

[2]Reasons for assigning this list of towns to the Tepanec Empire rather than to the early sixteenth century are given in Carrasco 1950: 269f. Further support for Carrasco's argument comes from the fact that while a number of Morelos towns are listed as under Tepanec control in this list, later lists of Tepanec territory in 1519--e.g. Cortés 1942--do not contain any Morelos towns.

[3]Both Chimalpahin (1965:83) and Tezozomoc (1975b:90) give Miahuaxihuitl as the name of the Cuauhnáhuac princess. Torquemada (1969, I:104) gives Miahuaxochitl, and is followed in this by Clavigero (1964:77). The Historia de los Mexicanos (1941:229) gives Miciucixiuci, closer to the former name, which is followed here. As for her father, the Cuauhnáhuac tlatoani, Torquemada (p. 104) gives Tezcacohuatzin, Nazareo et al. (1941:122) give Itzcoatzin, the Historia de los Mexicanos (p. 229) gives Escoaci (a corruption of Itzcoatzin), while Tezozomoc (p. 90) gives Ozomatzinteuctli. Itzcoatzin may be a shortened form of Tezcacohuatzin, which is the version used here.

[4]Davies speaks of "military campaigns in the Cuernavaca region" by Huitzilihuitl (1973a:49), and asserts without supporting data that the Mexica gained access to Morelos cotton "by force of arms" (p. 49). However, evidence presented in this section refutes both of these assertions. Barlow (1944:37; 1948a:194) suggests that the Mexica did not gain access to cotton until 1423, when they participated together with Cuauhnáhuac (and Tlatelolco) in a conquest of Cohuixco (this is discussed below). Barlow relates this event to Sahagún's statement (1950-69, bk.9:1) that during the reign of Tlacateotl of Tlatelolco (1407-1426), Tlatelolca merchants first started trading in cotton. However, while the Tlatelolca may not have had access to southern cotton until 1423, the sources clearly indicate that the Mexica first gained access to cotton a quarter century before this date.

[5]Davies (1980) makes two errors of citation on this event. On page 227 he states incorrectly that Culhuacan, not Cuauhnáhuac, conquered Cohuixco, citing the correct original source for Cuauhnáhuac. Then on page 241 he correctly identified Cuauhnáhuac as the polity involved, but cites only "Barlow" (no year) for the reference.

[6]The historical sources use three terms to refer to the area of Morelos: Tlahuic (or Tlalhuic), Tierra Caliente, and Marquesado. That these are generally regarded as equivalent names is attested to by statements such as the following: "la tlalhuica, que es la del Marquesado y

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Tierra Caliente" (Durán 1967, II:559); "Tlalhuis es otra gente que es la tierra caliente" (Origen de los Mexicanos 1941:258); or "los de la tierra caliente, que es todo el marquesado" (Tezozomoc 1975a:539); see also Torquemada (1969, I:261) or Durán (1967, passim). In his discussion of the 26 Basin of Mexico activities participated in by representatives from Morelos (see Table 8), Durán uses Tierra Caliente 20 times, Tlalhuica 4 times, and Marquesado 3 times (the first two are used together once). However, there are some cases where these terms are used in a more restricted sense. Durán in one place for example associates Tierra Caliente specifically with Cuauhnáhuac, excluding Yauhtepec, Tepoztlan, Yacapichtlan and Huaxtepec (1967, II:296). Ixtlilxochitl lists Cuauhnáhuac and Tlahuic separately in 3 places (1975, I:382, 446, 484); the latter may refer to the remainder of the Cuauhnáhuac province or to a larger segment of Morelos outside of the Cuauhnáhuac city-state proper.

[7]A number of independent sources were consulted in order to determine whether the towns in the 1532 list were merely barrios or estancies of city-states or actually had a higher sixteenth century political status indicative of separate city-states in 1519. Important sources in this respect include: an unpublished list of Cuernavaca subjects in 1551 (AGN, Hospital de Jesus, leg 289; transcribed by Druzo Maldonado); García Pimentel (1904); Visita, Tasación y Cuenta (1946); Villaseñor y Sánchez (1952); the Relaciones Geográficas; various documents cited in Gerhard (1970a and 1975); plus additional published and unpublished sources on sixteenth century Morelos. It should be noted that sources such as the Códice Municipal de Cuernavaca (1973) and the Títulos de Cuernavaca (1947) do not indicate the political status of towns mentioned, and were therefore not utilized in the definition of city-states.

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CHAPTER 4

ARCHAEOLOGICAL BACKGROUND AND METHODS: FIELD AND LABORATORY TECHNIQUES

This chapter presents information on the archaeological techniques and methods employed in the gathering and initial processing of ceramic data which are analyzed and described in Chapters 5 and 6. After a brief discussion of the few previous studies of Postclassic ceramics from Morelos, the excavations providing the bulk of the ceramics analyzed here are described. The excavation descriptions are followed by a discussion of the methods of ceramic analysis employed. Procedures of analysis in the laboratory and the ceramic quantification scheme are described, as are the general goals and methodological orientation that dictate the particular analytical techniques utilized in the present work.

Previous Studies of the Postclassic Ceramics of Morelos

The first publication of a Postclassic archaeological assemblage from Morelos was that of Vaillant and Vaillant (1934). Their work at the site of Gualupita in Cuernavaca was oriented primarily toward the Formative period occupations, to which the phase names Gualupita I and Gualupita II were given. These Formative deposits were located below a zone of Postclassic occupation, whose archeological materials were designated Gualupita III. The Vaillants' dating of this assemblage to a post-Teotihuacan, pre-Aztec time period (1934:126) was correct in general outline. Although they note that the pottery of the nearby site of Teopanzolco "is the same as that

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of Gualupita III" (1934:121), the former is assigned a later date in the Vaillants' chronology chart (p. 127). In fact, their earlier observation was correct; the Gualupita III ceramics are virtually identical to the ceramics of Teopanzolco and both belong to the Teopanzolco ceramic complex.

Two decades later, Noguera and Piña Chán (1956/57) published a brief description of ceramics excavated from three pits at Teopanzolco. Although they speak of a temporal sequence from bottom to top in the three pits (pp. 155-156), it is obvious from the figures and charts that at least one of the pits (no. 2) contains mixed deposits, with Aztec III Black-on-Orange sherds recovered below Aztec III Black-on-Orange sherds (Lámina IV). With the exception of the Aztec III sherds, the ceramics published by Noguerra and Piña Chán are identical to those studied by the author from the site, and may be assigned to the Teopanzolco ceramic complex.

Recently Norr (n.d.) has described a new complex of Postclassic ceramics from eastern Morelos. The material comes from a residential structure at the site of Tetla, excavated as part of the Chalcatzingo Project. These ceramics, which are referred to here as the Tetla complex, are important because they represent the first Postclassic ceramics to be described from eastern Morelos, and because they are dated by the only radiocarbon dates available for the Postclassic period in Morelos. The only other published information on the Postclassic ceramics of Morelos is contained in the brief reports of Muller (1956/57), Angulo (1976), Senter (1976, 1980), and Smith (1981a).

Several unpublished theses also contain descriptions and analyses of Postclassic ceramics from Morelos. Litvak (1970) presents a chronology of eight phases for the Prehispanic era in the Xochicalco vicinity.

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Although he briefly describes a series of ceramic types and lists their occurrence per phase, no information is given on how the chronology was developed. This makes it impossible to evaluate Litvak's chronological sequence, and further, presents problems for comparative analysis; the Postclassic chronology developed here differs in a number of major respects from that presented by Litvak (1970). Senter (1976, 1980) utilizes Litvak's typology and chronology in his studies of the Postclassic site of Zacatepechi, but does not address the problems of corroborating or refining the sequence. Based upon a brief inspection of the ceramics of Zacatepechi, I would assign them to the Cuauhnahuac ceramic complex.

Mason (1980) analyzes the spatial structure of the Late Postclassic site of Coatlan Viejo in Western Morelos. His description of the ceramics, which pertain to the Cuauhnáhuac complex, represents the most complete treatment of a collection of Late Postclassic ceramics yet available from Morelos. In addition, the theses of Grove (1968) and Alducín (1980) contain some brief information on Postclassic ceramics of Morelos, as do the unpublished reports of Arana (1976), Arana and Denis (1977), Lewarch and Mason (1977), and Smith (1981b).

In summary, the only prior attempt to develop a chronological sequence for the Postclassic period in Morelos is that of Litvak (1970). However, lack of supporting data and differences between Litvak's sequence and subsequent work in Western Morelos make it difficult to fully evaluate or utilize this chronology. Other work on the archaeology of Postclassic Morelos has produced descriptions of isolated assemblages. These studies, while useful in a number of respects, remain to be integrated into a

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comprehensive chronological and geographical system for Postclassic Morelos.

Excavations at Xochicalco, 1977

The Postclassic ceramic chronology for western Morelos is based primarily upon excavations conducted in the summer of 1977 by the Xochicalco Mapping Project under the direction of Dr. Kenneth G. Hirth.[1] As the first season of a multi-stage continuing project at Xochicalco, the primary goal of these excavations was to encounter deposits which would allow construction of a chronological sequence for the site and vicinity (Hirth and Arana 1978). While the major focus of the Xochicalco Mapping Project has been on the Epiclassic and Classic occupations of the site (see Hirth n.d.), the 1977 excavations were designed to yield information on the entire span of occupation of Xochicalco, including the Postclassic period under study here. The major areas of Xochicalco with excavated Postclassic deposits are El Puerto and Terrace 85; in addition Postclassic ceramics from Excavation B at the adjacent site of Tlacuacingo were analyzed.

Excavation units were located with reference to separate coordinate grids in each of the areas tested. Most units were 2 meters square in size; these pits were expanded when required to expose interesting or relevant archaeological features. Excavation proceded by natural soil zones (referred to here as "capas"), which were subdivided where necessary into metric levels of 20 and sometimes 10 cm depth. All soil was sifted through a 1/4 inch mesh screen, and soil samples for flotation, pollen analysis, and other studies were taken from certain deposits. The descriptions which follow are each divided into two parts. First the excavation procedures, natural stratigraphy and associated features are described, based upon the

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field notes and preliminary reports by the excavators.[2] Then an interpretation of the cultural stratigraphy and depositional history of each excavation is given, based upon my ceramic analysis and the excavation reports. All depth measurements are given in centimeters below surface.

Excavation B, El Puerto.--The area referred to as El Puerto is a small terraced hill approximately 500 meters west of the main Xochicalco ceremonial zone (Figure 7). The top of the hill is covered by a large artificial platform upon which are several mounds surrounding a plaza area (Figure 8). Four test excavations were undertaken in El Puerto; these are referred to as excavations B, C, D, and E.

Excavation B was placed in the center of the main plaza of El Puerto (see Figures 9 and 10). A total of four contiguous units (labeled pits B, B-extension, F and G; see Figure 9) were excavated to cover an area of 6.5 square meters. After 18 cm of loose dark topsoil (Capa I), a zone of grey soil with large rocks and pieces of broken stucco was encountered (Capa II). This deposit ended at 46 cm with a well-preserved stucco floor and associated (or earlier) stone wall segment in pit B. The floor was broken in several places in pit F. The easternmost break, circular in form, was associated with a burial of a juvenile individual immediately beneath the floor level. This burial, called "Intrusive A" in the field notes, contained two partial ceramic vessels. After removal of the burial, excavation continued below the floor. A 10 cm foundation layer of compact powdery soil and pebbles (Capa IV) was encountered immediately under the floor. The next capa was a level of large rocks 10 cm thick, followed by tepetate (sterile) at a depth of 70 cm; excavation stopped at 90 cm.

Cultural debris is quite scanty below the floor in Excavation B.

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Figure 7. Map of Xochicalco, showing El Puerto and Terrace 85. The outlined area is enlarged in Figure 8. (Base map courtesy of Xochicalco Mapping Project.)

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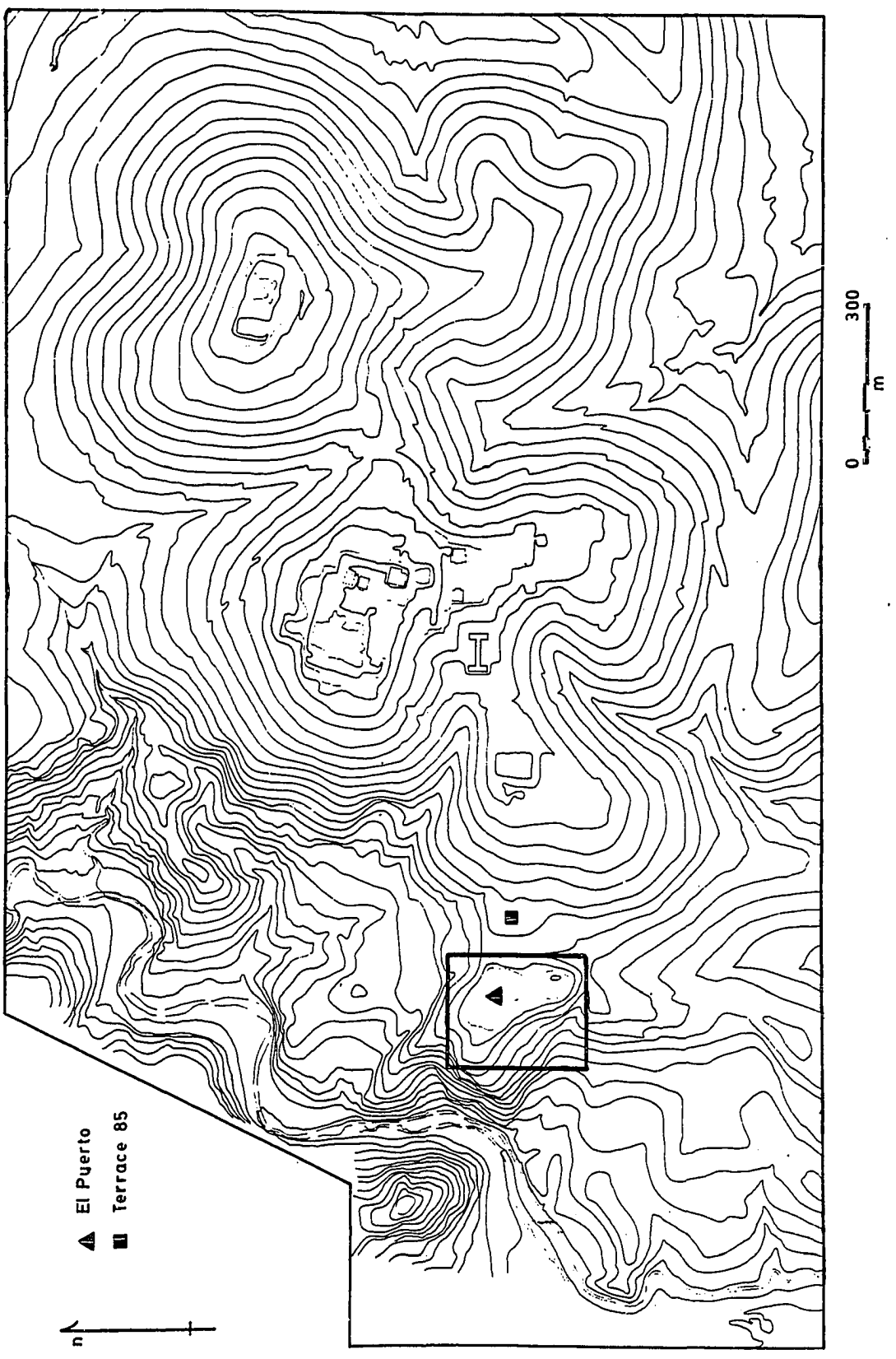

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Figure 8. Map of El Puerto, showing the locations of the 1977 excavations. The contour interval is 5 meters.

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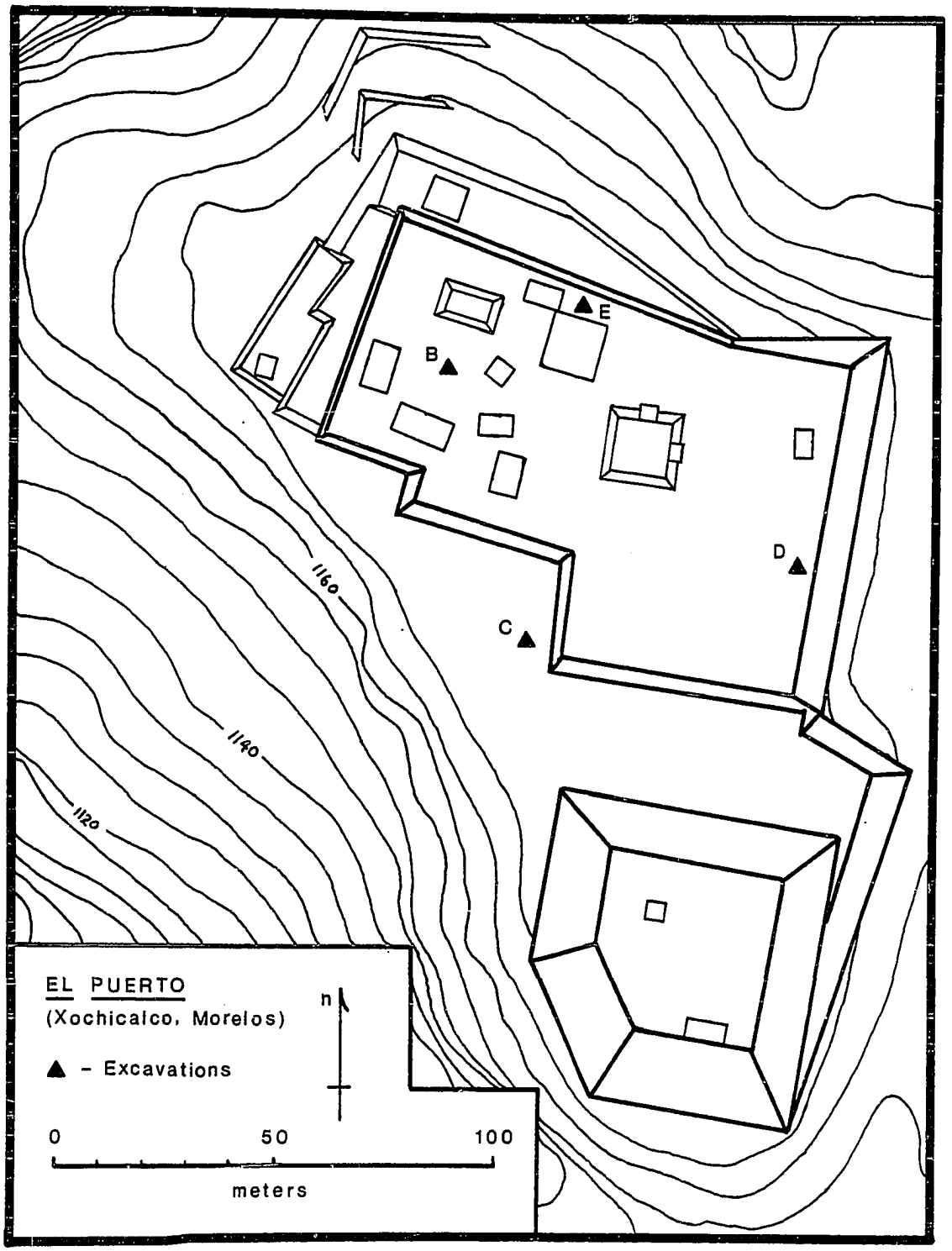

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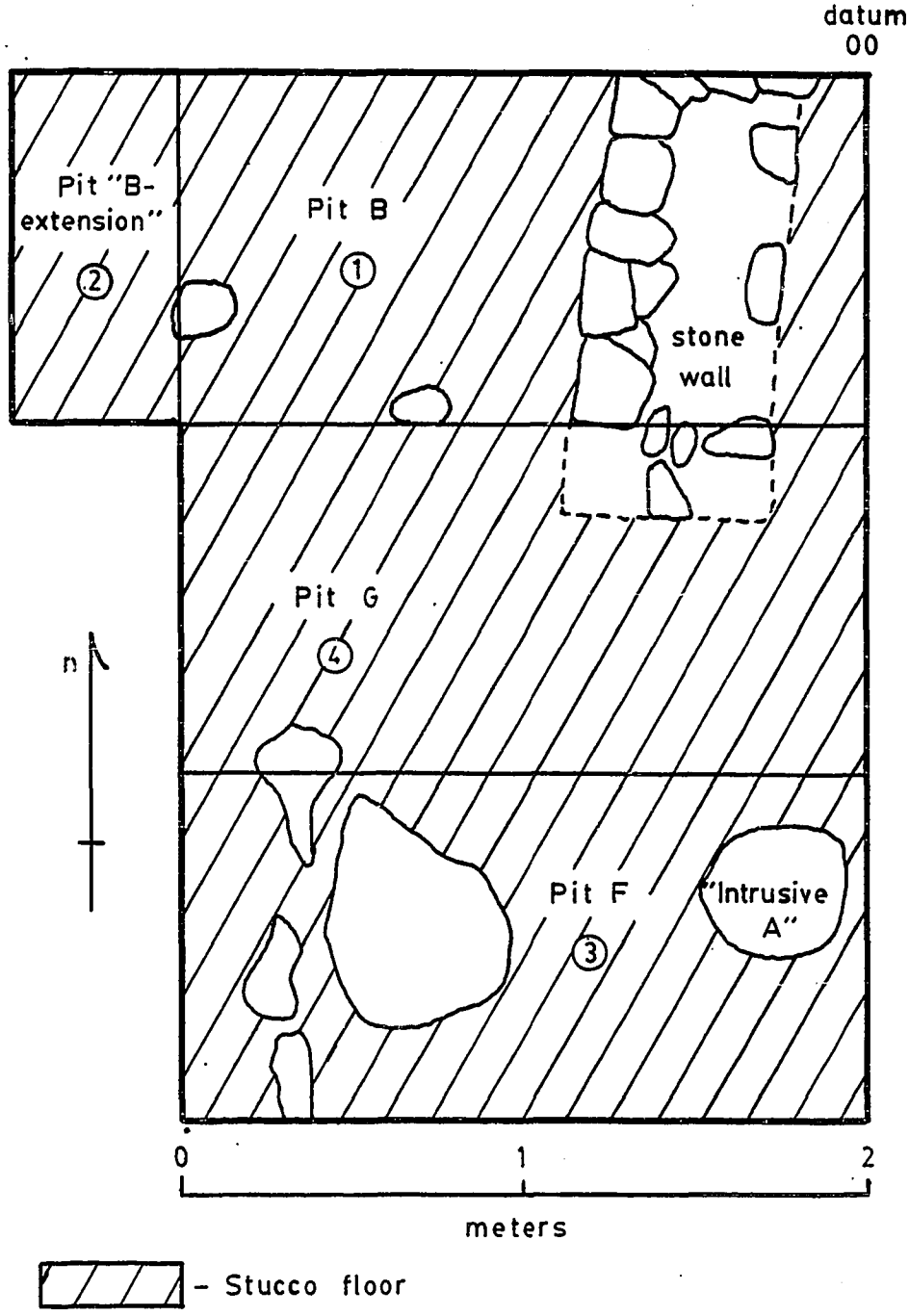

Figure 9. Plan of Excavation B, El Puerto, at 46 cm. below surface. In this and successive figures, circled numbers indicate quantified provenience units.

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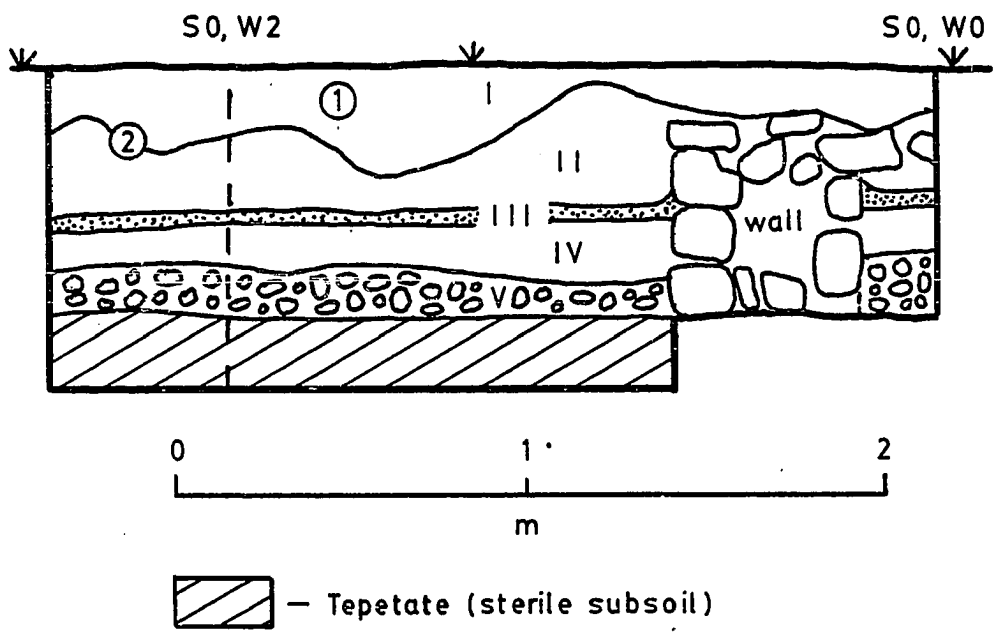

Figure 10. Profile of Excavation B, El Puerto (North Wall). In this and successive figures, Roman numerals indicate excavated capas.

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Sherds are eroded and represent a mixture of Phase F or Phase G ceramics with some Postclassic ceramics (one eroded Tlahuica polychrome sherd dates to either the Temazcalli or Cuauhnáhuac phase). A carbon sample from this level yielded a radiocarbon date of A.D. 735 ± 50 (Kenneth G. Hirth, personal communication); this is probably associated with the Phase G component found below Postclassic occupations in many of the El Puerto excavations. The stucco floor at 46 cm was probably the main plaza floor during the final or penultimate period of occupation at El Puerto. The associated stone wall, interpreted by excavators as part of the formal plaza architecture (perhaps a small platform) and not a residential structure, contained several sherds dating to the Temazcalli phase. The entire 46 cm of soil above the floor (Capas I and II) appear to represent a single Late Cuauhnáhuac phase component, probably deposited after the main period of plaza utilization had terminated. There is nothing to suggest that materials in this deposit are associated with specific activities taking place on the plaza surface. The ceramics in this deposit, while not very numerous, are quite homogeneous, and sherds from individual vessels were recovered separately from the two capas in each of pits B, F, and G (as well as separately across pits F and G). For this reason, Capas I and II are lumped together and each pit is considered a single unit in the data file; these are units no. 1, 2, 3, and 4.[3] An apparent cache of several broken bowls was recovered in the eastern half of Pit G, Capa I (provenience no. XSP-179). Pieces of three nearly-complete polished brown-black bowls (vessels V-50, 51, and 52) were recovered, as well as fragments of at least four other bowls. These may represent a special deposit that post-dates the main Excavation B occupation, though no evidence

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of an intrusive pit was reported; this deposit is unit no. 80 in the data file and is referred to as Cache 1.

Excavation C, El Puerto.--Excavation C consists of a single 1 by 2 meter excavation on the first terrace below the central El Puerto plaza area on its south side. A single capa of soil 27 cm deep was found to rest directly upon sterile tepetate. This capa, subdivided into two excavation levels, contains ceramics of the Early Cuauhnáhuac complex; these are unit 5 in the data file.

Excavation D, El Puerto.--This excavation was placed upon a wide terrace near the top of the eastern side of El Puerto hill in an area of dense surface debris. Three pits, each 1 by 2 m, were dug. First pit D1 (S 0-1, W 0-2) was excavated; then pit D3 (S 0-1, E 6-8) was placed 6 meters to the east, followed by pit D2 (S 0-1, E 4-6) adjacent to D3. These pits were quite deep and contain complex stratigraphy; only the upper portions of the pits that contained Postclassic materials are described in detail here.

Pit D1 (Figure 11).--After 10 cm of black topsoil (Capa I), a zone of grey humus extending to 53/60 cm was encountered. This zone was subdivided by a metric level at 20 cm (Capa IIA) and a subtle soil change at 40 cm (Capas IIB and III).[4] Capa IV consists of a crushed tepetate floor extending from 53/60 to 70/93 cm. The complex stratigraphy below this floor is only summarized briefly here, since it is of limited relevance to the Postclassic occupation. After an 80 cm capa (V) of hard buff-colored soil matrix with small rocks, a faced stone retaining wall with rough rock fill was encountered running north-south in the eastern half of the pit. Excavation continued in

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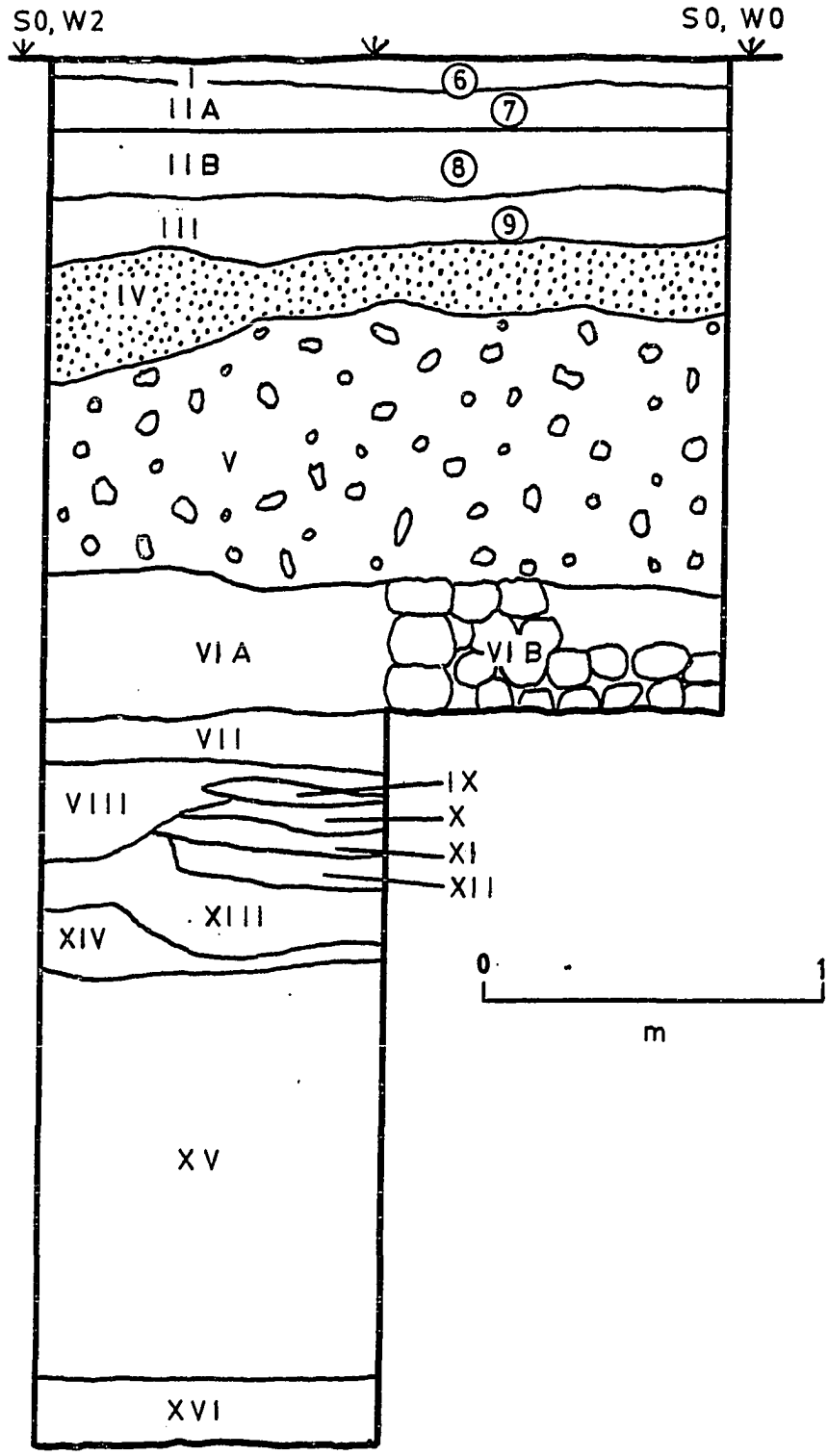

Figure 11. Profile of Excavation D, Pit D1, El Puerto (North Wall).

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the western meter only. The soil from 200 to 260 cm consists of a series of thin lenses of varying soil colors and textures (Capas VII-XIII). The zone from 260 to 380 cm comprised a single capa (XV) of hard packed clayey soil, after which a 20 cm capa (XVI) of brown soil without clay was encountered. Excavation was terminated at 4 meters due to the dangerous condition of the pit and lack of time to expand the excavation; sterile tepetate was not encountered.

Ceramics recovered below the crushed tepetate floor dated to Phase G and possibly earlier. Ceramic densities were moderate to heavy below Capa VI and the stone wall, probably pertaining to a succession of Phase G occupations. Capa V, between the wall and the tepetate floor, contained only a very few highly eroded sherds. These appear to date to Phase G on the basis of forms and paste, but this identification is tentative. The crushed tepetate floor also contained very few ceramics, although a single Toluca Red-on-White trade sherd (Tilancingo phase) was present. The presence of this sherd in the floor, sealed below the Phase G occupation of Capa III, dates the construction of the floor to the Tilancingo phase.

Ceramic densities above the floor are very high--2367 sherds per cubic meter--which is the highest density of any Postclassic deposit studied. Capa III is a Tilancingo phase deposit, while the metric division of Capa II at 20 cm marks a change from the Temazcalli (IIB) to the Early Cuauhnāhuac (IIA) phase; Capa I also dates to the latter phase. This pit presents the best evidence for the division of the post-Phase G time span into three phases. The only problem with this pit in terms of chronological analysis concerns the cultural discontinuity between Capas IIA and IIB which does not correspond to a natural stratigraphic change; there does not appear

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to be much mixing here, however. These four strata (Capas I, IIA, IIB, and III) are numbered 6 through 9 respectively in the data file.

Pits D2 and D3 (Figure 12).--Excavation D3 was placed 6 meters east of excavation D1. The first capa of 20 cm consisted of black topsoil. This was followed by 20/25 cm of powdery grey soil, subdivided into Capas IIA and IIB by a soil change at 30 cm (see note 4). Capa III consisted of a thin stucco floor observed in the west wall profiles of pits D2 and D3, but missed during excavation. In the D3 west profile (E6, S0-1), the floor was 4 cm thick and ranged in depth from 55 to 65 cm. At E4, however, the floor was 10 cm thick, lying between 52 and 65 cm; a large rock was embedded in the floor at datum point S0, E4. In the two profiles where the floor was noted, it was underlaid by a capa of densely-packed yellow crushed tepetate (Capa IV). This capa corresponds to the crushed tepetate floor comprising Capa IV in pit D1 and probably represents a floor-preparation level under the stucco floor observed in the two profiles. It is likely that the plaster covering originally covered all of Capa IV throughout pits D1, D2 and D3, but has since decomposed beyond recognition in most places. Below Capa IV, a layer of large rocks in a compact grey soil matrix (Capa V) was encountered. This capa sloped down to the east and was underlaid by compact dark brown soil (Capa VI). At 142 cm, a thin stucco floor was encountered which rose sharply up in the eastern third of the pit and rested upon a second floor fragment in the easternmost 30 cm of excavation. These floors (Capas VII and VIII) in turn rested upon a layer of very large stones (Capa IX) which extended to 190 cm. When these had been removed, pit D2 was excavated immediately to the west in order to enlarge the pit for deeper excavation. Natural capas were not followed, and levels of 0-20, 20-60,

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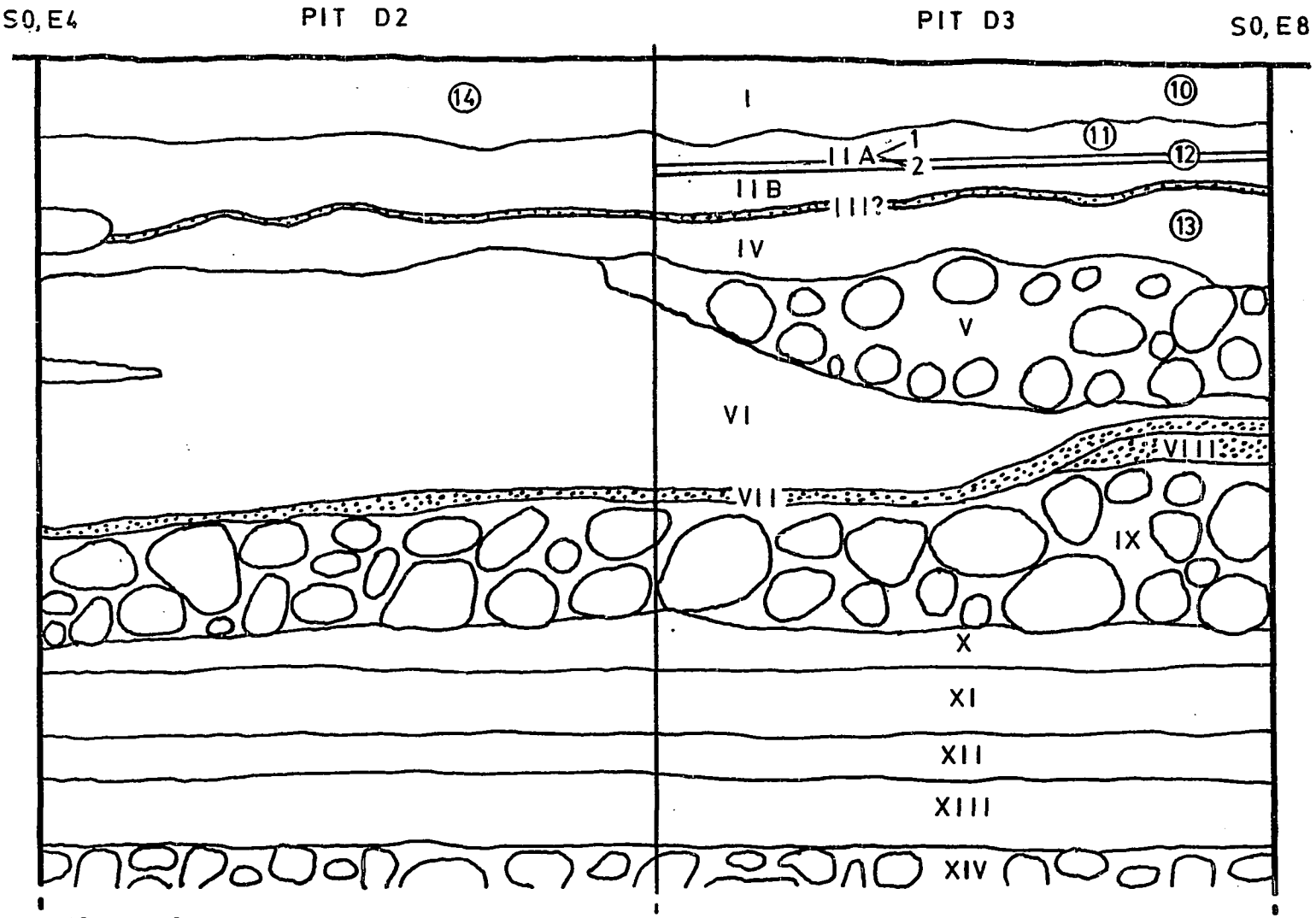

Figure 12. Profile of Excavation D, Pits D2 and D3, El Puerto (North Wall). Only the upper portion of Capa XIV (which extends to a depth of over 4 meters below surface) is shown. Scale is the same as the previous figures (5 cm = 1 m).

60-100, and 100-140 cm were removed as single units.[5] The stratigraphy in the second excavation was nearly identical to that of pit D3, with the exception that the upper rock layer (Capa V) ended in the easternmost 20 cm of pit D2. From 190 cm down, pits D2 and the western half of D3 were excavated together, though artifacts were bagged separately. Four alternating capas of yellowish and dark brown compact soil (Capas X to XIII) were found beneath the Capa IX rock layer. At 260 cm, a capa of large rock fill was encountered (Capa XIV) that extended to 4 meters, at which point excavation was terminated.

Below the lower stucco floor (Capa VII), ceramic densities are very low. Most sherds are highly eroded and probably represent construction fill; the few diagnostic sherds in these levels date to Phase G or possibly earlier. Capas V and VI above the floor contain somewhat greater quantities of ceramics, also eroded, but dating to Phase G and the Tilancingo phase. These deposits are probably fill for the Postclassic construction of the upper floor, but the dating of the lower floor is problematic. The crushed tepetate capa (IV) contains Tilancingo phase ceramics, as do Capas IIA and IIB above the stucco floor, while the top capa (I) contains Temazcalli phase ceramics. The pit D3 deposits are numbered as follows: 10 (Capa I); 11 and 12 (Capa IIA, divided metrically); and 13 (Capa IV). Capa IIB produced an insufficient number of sherds for quantification, while Capa III, the stucco floor, was missed during excavation and hence produced no materials. Capa I of pit D2 is number 14 in the data file, but the lack of information on vertical provenience for deposits below 20 cm in this pit (see note 5) prevents stratigraphic control over this material. These deposits, which contain Tilancingo phase markers, were not quantified.

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In summary, the upper 60 cm of pits D2 and D3 contain evidence of Tilancingo phase construction (the stucco floor), and occupation during the Tilancingo and Temazcalli phases. The Postclassic stratigraphy correlates with that observed in pit D1, although the Early Cuauhnáhuac phase occupation at the top of that pit is lacking in D2 and D3.

Excavation E, El Puerto (Figure 13).--Excavation E was a single 1 by 2 m pit placed on the sloping side of El Puerto hill, some 30 meters north-northwest of the center of the main plaza. The first capa, from ground surface to 26/40 cm, consisted of black topsoil and was subdivided into 2 metric units. Capa II, a lighter-colored soil with much broken and eroded stucco, contained a large faced and two unfaced stones along the south wall of the excavation unit; immediately to the east of the faced stone was a pit intrusive from Capa I down to the level of Capa III. This third capa consisted of dark brown soil and rested upon sterile tepetate at 75 cm; excavation was terminated at 80 cm.

Capa III contains Phase G ceramics, while Capa II produced a small number (43) of sherds dating to the poorly understood Phase H. This deposit was quantified (no. 17) in spite of the small sample size, because of the general rarity of Early Postclassic deposits suitable for quantification. The arbitrary division of Capa I into 2 metric units (IA and IB) apparently falls close to or at a natural stratigraphic change, since the lower level (no. 16) dates to the Temazcalli phase while the top level (no. 15) contains Early Cuauhnáhuac phase deposits. The possibility of some mixing here must be borne in mind, however.

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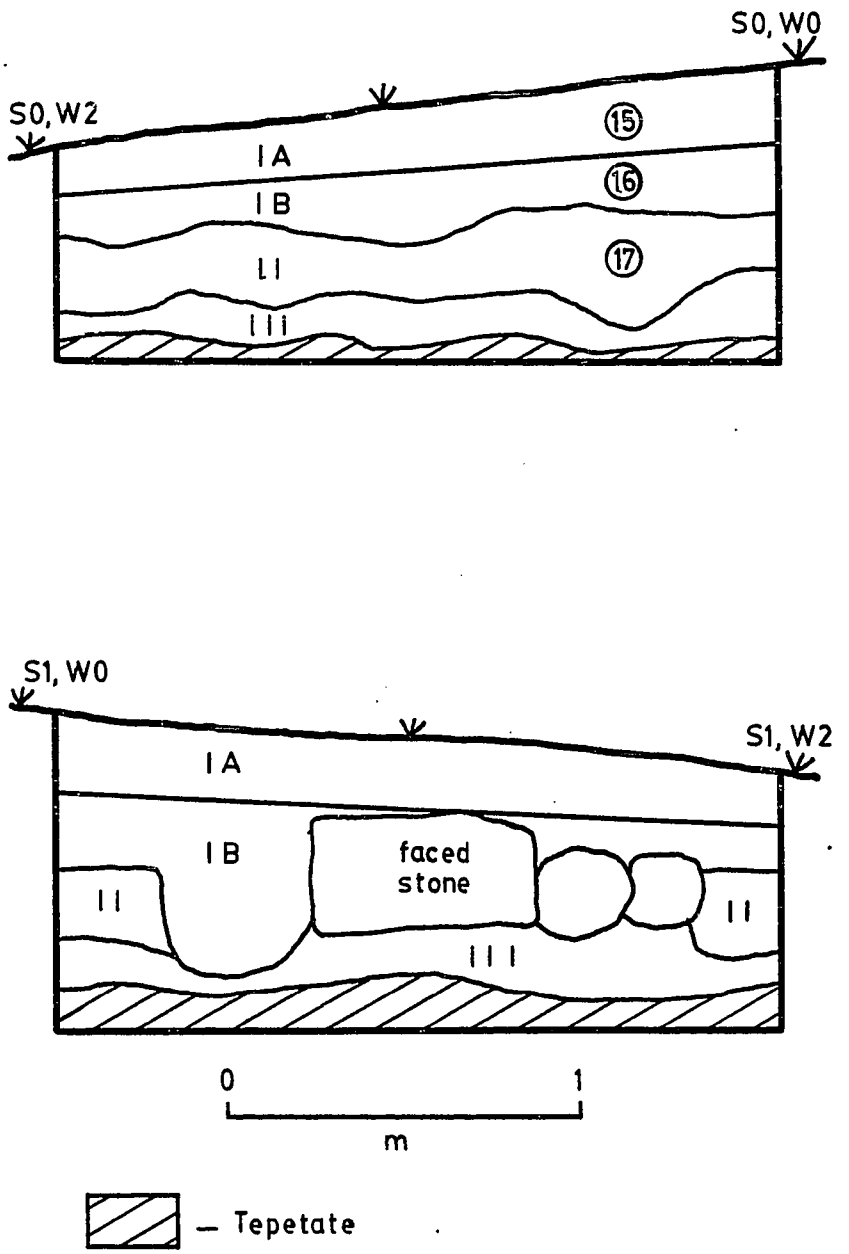

Figure 13. Profiles of Excavation E, El Puerto (North and South Walls).

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Excavation A, Terrace 85.--Terrace 85 is a wide terrace running north-south on the west side of La Malinche, across a ravine from El Puerto. Three excavations were dug on this terrace using a single coordinate grid. These excavations are referred to here as A, B, and C.

Excavation A (W 0-1, S 3-6) was a 1 by 3 m pit excavated in four 10 cm levels until tepetate was reached at 40 cm. Two soil zones were present: Capa I (0-24 cm) consisted of dark brown loam, while Capa II (24-40 cm) was lighter brown in color and contained a moderate number of pebbles and small rocks. It appeared initially that Capa I dated to the Cuauhnáhuac phase while the lower capa was Temazcalli in date; for this reason, the mixed level (20-30 cm) containing the stratigraphic break was not quantified. It later turned out that while Capa II (no. 20) does date to the Temazcalli phase, the metric division at 10 cm separates another Temazcalli deposit (Capa IB, no. 19) from the final Cuauhnáhuac level (Capa IA, no. 18). Thus the possibility of mixing may exist here, although no clear evidence of it can be discerned.

Excavation B, Terrace 85.--Excavation in this pit (W 1.5 - E 0.5, S 12-15) began in the central portion (W 0-1, S 12-15). The stratigraphy was noted as being similar to that observed in Excavation A--a 20-25 cm deep Capa I of dark brown loam followed by a second capa to 40/45 cm which was somewhat different in color and texture from Capa II in Excavation A. At 35 cm, several human bones were observed extending into the eastern wall of the excavation, so pit extension E 0-0.5, S 13-14 was excavated, followed by unit E 0-0.5, S 12-13. A stone wall segment separated these two new units. North of the wall, several badly fragmented non-articulated long bones were encountered. South of the wall, a minimum of 5 non-articulated secondary

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burials were found between 25 and 45 cm.[6] Although the excavation report states that "no grave goods were recovered in association with [these] burials," sherds from at least nine vessels were recovered from the soil matrix of the burials. Seven of these vessels were polished brown-black bowls, a number of which could be pieced together to form whole or nearly-whole vessels. These burials are collectively labeled Burial 2, and the vessels are quantified as unit 81 in the data file.

After removal of the five secondary burials in the pit extension, two possibly extended burials were noted extending westward back into the main pit. When the central unit was excavated further, it was found that there were a minimum of seven burials with elaborate grave goods lying in a pit cut 50 cm into the tepetate. The burials were contained in the soil zone called Capa III, extending from 35 to 90 cm, and constituting the burial fill. Only two of the burials were completely articulated and in a flexed position; the others appeared to be partially articulated. The excavator noted that "these partially articulated burials may represent primary burials of partially decomposed bodies." Grave goods in association with the burials included 16 whole or broken ceramic vessels and fragments of two other bowls in addition to manos and metates, spindle whorls, obsidian blades, and a small copper dog and three copper bells (Figure 14). These burials are called Burial 1, and the associated vessels comprise unit 82 in the data file.

The excavator's interpretation of the relationship between the seven burials in the central pit and the five secondary burials in the eastern extension was that the latter "were added at a later time period and not associated temporally with the bones in the tepetate pit in the main section

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Figure 14. Photograph of Burial 1, Terrace 85. Only the original burial pit (and not the entire excavation) is shown here. Photograph courtesy of Kenneth G. Hirth.

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of the unit." This interpretation and the contextual data, along with study of the burial vessels and sherds excavated above and around the burials, indicate that the main burials (Burial 1) represent a Temazcalli phase event and the secondary burials (Burial 2) a later Early Cuauhnáhuac event. Ceramics in Capa I above the main burials included exclusively Cuauhnáhuac markers; this fact and the similarity of the Capa I soils in Excavations A and B suggest that this is an undisturbed Late Postclassic deposit laid down after the burials were already placed. The lack of evidence of a burial pit or stratigraphic mixing in Capa I supports this interpretation. The soil zone from 25 to 35 cm (Capa II) covers the deposits between Capa I and the burials. It contained exclusively Temazcalli markers, including pieces of a partially complete Incised Guinda bowl. It is not clear whether this zone represents burial fill or occupational refuse deposited after placement of the burials; in either case, the Temazcalli ceramics seal the burial and place it in that phase (the polychrome burial vessels all date to this phase as well).

Burial 2 may be dated to the Early Cuauhnáhuac phase. The seven polished brown-black bowls found in association with these burials are good markers of this phase (see Chapter 6). The fact that a number of these could be reassembled to whole or nearly-whole vessels (the breaks were not fresh) in spite of fragments being scattered throughout 50 to 60 cm of fill suggests that the bowls were deliberately broken and thrown into the pit along with the secondary burials. Capa I above these burials contained exclusively Early Cuauhnáhuac phase markers. No burial pit was observed during excavation, so it cannot be determined whether Capa I represents burial fill, occupational refuse, or a mixture of the two.

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Excavation C, Terrace 85.--There are no data on soils from this excavation, which was located at W1 - E1, S 30-33. The zone from 0 to 50 cm contained moderate to high densities of ceramics with several markers of both the Temazcalli and Early Cuauhnâhuac phases. At 50 cm, tepetate was reached and two pits extending into the tepetate were observed. One pit at the south end of the excavation was shallow and contained less than 10 highly eroded sherds. The other pit, at the north end of the unit, was found to be 40 cm deep and to contain three burials (Figure 15). Two of the burials were primary adult burials, lying in the bottom of the pit between 70 and 90 cm; the third was a partially-articulated youth found above the adult skeletons in the level from 50 to 70 cm. Five complete ceramic vessels were recovered from the 70-90 cm level, and appear to have been associated with the adults; these burials are referred to as Burial 3 and the associated vessels comprise unit 83 in the data file. A spindle whorl and several green obsidian blades were recovered in the vicinity of the youth burial and may have been associated with it. In addition, fragments of an orange slipped bowl were recovered throughout the burial pit (from 50 to 90 cm), while fragments of a Type B-3 polychrome bowl were scattered through the burial pit and the 12 cm of soil immediately above the pit (38-50 cm). A number of isolated sherds were also recovered from the burial pit, including several polychromes and one sherd of an Aztec III Black-on-Orange miniature bowl.

The burials in Excavation C appear to represent a single mortuary event dating to the Early Cuauhnâhuac phase, as shown by the associated ceramics (see Chapter 6). A few scattered Temazcalli phase markers were recovered from the soil above the burial pit. These probably result from

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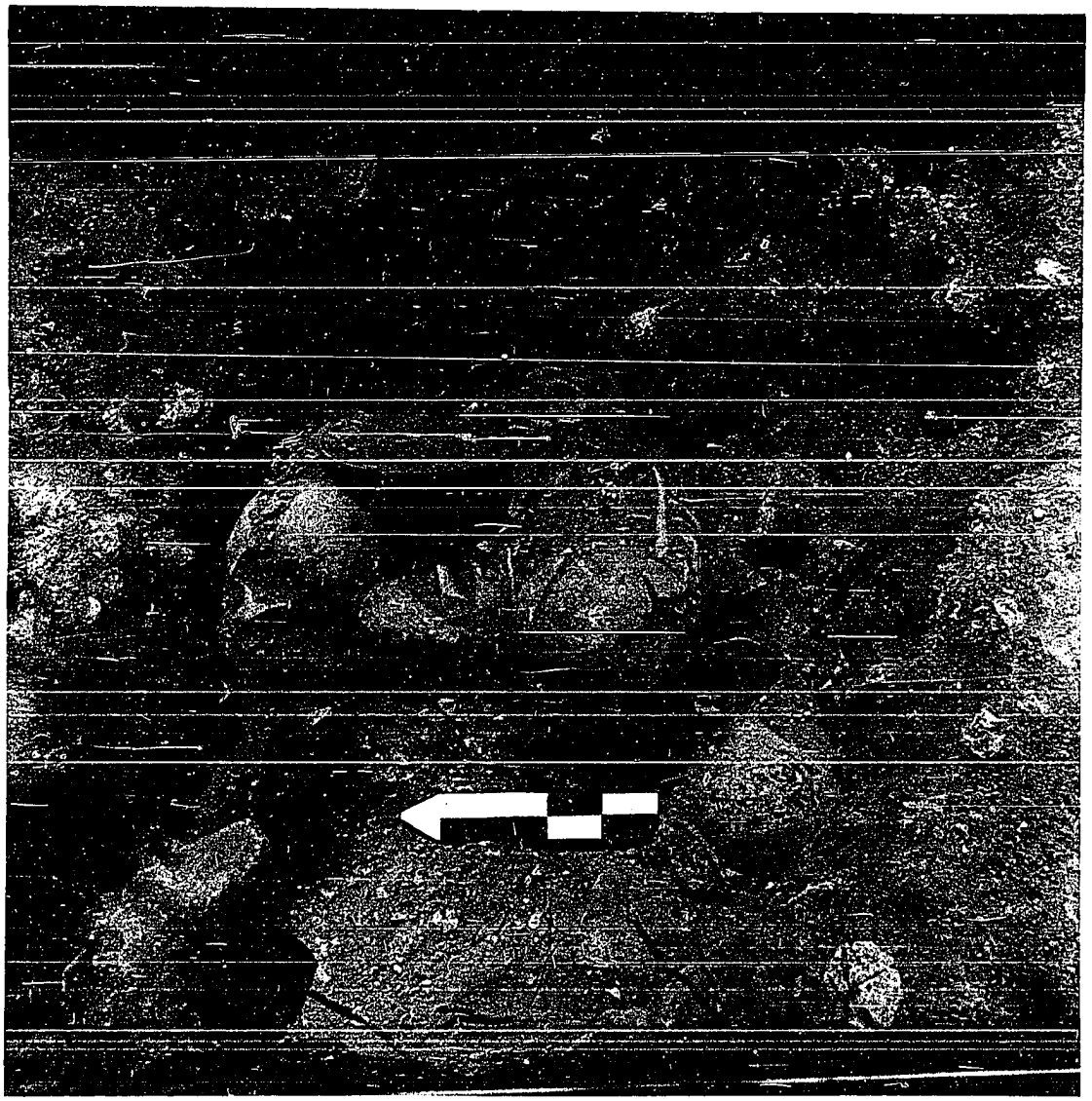

Figure 15. Photograph of Burial 3, Terrace 85. Only the original burial pit (and not the entire excavation) is shown here. Photograph courtesy of Kenneth G. Hirth.

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either: (1) the use of Temazcalli phase refuse deposits in filling the burial pit above the level of the tepetate; or, (2) a Temazcalli occupational deposit through which the burial pit was cut. No evidence of such a burial pit was reported for the soil above the tepetate level of 50 cm, however.

Excavation B, Tlacuacingo.--Excavation B at the nearby site of Tlacuacingo was a 1.5 by 2 meter excavation located in a small plaza in the central ceremonial zone of the site. The first excavated level of 20 cm, in very dark brown humus, contained a dense (Early?) Cuauhnáhuac phase occupation. After 4 cm of soil lacking ceramics, the remaining 60 cm of the pit down to sterile tepetate at 84 cm produced only small amounts of eroded Phase G (and possibly earlier) ceramics. The Postclassic ceramics from Capa I were studied and quantified in the initial phase of analysis, but were not restudied or coded for further analysis due to lack of time.

Summary of 1977 Excavations

The goal of the 1977 excavations at El Puerto and Terrace 85 was to encounter stratigraphic deposits for chronological analysis, and as such the excavations were quite successful. Because documentation of the architectural and occupational history of these two areas per se was not of major interest, excavations were not placed on mounds, terrace edges and other areas of high architectural information. Nevertheless, a few inferences may be made on this issue based upon the results of the excavations.

During Phase G, there is evidence of occupation (in Excavations D and E) and construction activities (Excavation D) on the El Puerto hill.

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It is difficult to judge the nature of the construction, but the wall in pit D1 and the lower stucco floor and underlying stone fill in pits D2 and D3 may represent terracing and levelling operations similar to those which ring the main Xochicalco hill.

The single Phase H deposit does not appear to be associated with any construction activities. Later, there is evidence of further construction activities, probably more terracing and levelling, in the Tilancingo phase levels of Excavation D. The crushed tepetate floor in these pits (Capa IV) dates to this period, as does the occupation debris immediately above the floor.

The densest deposits of occupational debris encountered in El Puerto are the Temazcalli phase levels in Excavation D. The only evidence for construction activities during this period consists of the wall in Excavation B, which is dated by sherds from the wall matrix. If this wall is part of the formal plaza architecture, as the excavator suggested, then construction of the mounds and plaza floor may date to this period as well. Terrace 85 was occupied for the first time during this period (Capa II), and a complex burial with relatively elaborate offerings was deposited during the Temazcalli phase.

The Early Cuauhnáhuac phase occupation is the most widespread at El Puerto and Terrace 85, occurring in all excavations except pits B and D2/D3. No specific evidence was encountered of Early Cuauhnáhuac phase construction, however. The Late Cuauhnáhuac phase material above the plaza floor in Excavation B was almost certainly deposited after termination of the main period of plaza utilization (during which the plaza would presumably have been kept clear of refuse and debris). Sherd fill in the

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Excavation B points toward a Temazcalli phase date for the plaza architecture, but an Early Cuauhnáhuac phase date cannot be ruled out, because the Excavation B deposits date to the Late Facet of the Cuauhnáhuac phase (see Chapters 5 and 6). Early Cuauhnáhuac phase occupation is also found on Terrace 85, along with a deposit of secondary burials.

Usefulness of the El Puerto and Terrace 85 Deposits for Chronological Analysis

With the exception of the Terrace 85 burials and a possible special deposit of vessels encountered in Excavation B, most of the Postclassic material excavated at Xochicalco in 1977 appears to represent secondary refuse, or refuse deposited away from its use-location (Schiffer 1976:30). The identifying characteristics of secondary refuse are: "(1) Predominantly worn-out, broken, or otherwise unusable materials, (2) a high diversity of materials . . . and (3) a high relative density of materials" (Schiffer 1976:129). The applicability of these characteristics to the deposits described above is shown by the information presented in Table 12. Characteristic 1 is indicated by the generally small size of the sherds recovered (mean of 9.5 grams per sherd). The presence of spindle whorls, figurines, and painted plaster in most of the excavations illustrates the diversity of materials in these deposits; in addition, most levels produced obsidian and other lithic materials, as well as special purpose artifacts like incensarios. The high density of materials (characteristic 3) is illustrated in Table 12 by sherd density (number of sherds per cubic meter of excavated deposits). Although there is a considerably variation in this figure, most pits have relatively high ceramic densities indicative of secondary refuse deposits. As discussed in the following chapter, secondary refuse is one of the best

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TABLE 12

POSTCLASSIC SECONDARY REFUSE AT XOCHICALCO

Excavation	No. of sherds	Weight[a]	Avg. sherd weight	Vol.[b]	Sherd density[c]	Presence of specials[d]			Quantified provenience units
						A	B	C	
B	820	9632	11.8	2.22	369.4	x	x	x	1, 2, 3, 4
C	218	1475	6.8	0.54	403.7	-	x	-	5
D1	2509	23275	9.3	1.06	2367.0	x	x	x	6, 7, 8, 9
D2/D3	1040	11599	11.2	1.60	650.0	x	x	x	10,11,12,13,14
E	806	8743	10.9	1.20	671.7	x	x	-	15,16,17
Ter. 85	955	6880	7.2	0.90	1061.1	x	x	x	18,19,20
Tlacuacingo	797	6306	7.9	0.60	1328.3	x	x	x	none
TOTAL	7145	67910	9.5	8.12	888.1				

[a]Weight in grams

[b]Volume of Postclassic deposits in cubic meters

[c]Sherd density in sherds per cubic meter

[d]Presence of specials: A--spindle whorls; B--figurines; C--painted plaster

kinds of archaelogical deposit for purposes of chronological seriation.

The only problems with the deposits described above in terms of their usefulness for chronological analysis are the three cases of possible mixing (between units 7 and 8 of pit D1; units 15 and 16 of pit E; and units 18 and 19 of Excavation A). These were discovered after completion of the ceramic analysis, when it was seen that the metric subdivision of capas in fact marked a change from ceramics of one phase to the next. As shown by the seriation described in Chapter 5 and the analysis of ceramics by phase in Chapter 6, these three cases do not appear to present serious problems; they should be kept in mind, however. Aside from this minor issue, the Postclassic deposits excavated at Xochicalco in 1977 are ideal for chronological seriation. None of the quantified levels contains material from more than one capa as reported by the excavators and shown in the excavation profiles.

Ceramic Analysis: Goals and Methods

The field of artifact classification in archaeology is characterized by a discrepancy between published programmatic statements of how classification ought to be done and the actual procedures employed by archeologists in classifying their artifacts. One of the most important themes propounded in the published literature on systematics is that the kind of classification employed in any given instance should depend upon the particular goals or objectives of that study; different goals will require different classifications of even a single set of archaeological materials (e.g. Brew 1946:44-66; Rouse 1960; Lathrap 1962:246; Dunnell 1971a; W. Adams 1975; Read 1982; this concept is implicit in Spaulding's 1960 discussion of the dimensions of

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archaeology). In discussing this notion, Hill and Evans (1972:241-244) list four major goals or problem orientations that have traditionally guided archaeological classification: (1) description of artifact collections and assemblages (yielding "descriptive types"), (2) determination of the emic cognitive categories (or "mental templates"--see Deetz 1967:45ff) of the original makers and users of archaeological materials; (3) establishment of local or regional chronologies; and (4) determination of the functions or uses of artifacts. Hill and Evans (1972:244f) go on to point out that while these four goals each require different kinds of classifications, most archaeologists have traditionally sought a single classification which would cover all needs, rather than reclassifying artifacts separately for different goals. They criticise such procedures and illustrate how new problems require new classifications of archaeological materials. Similarly, Lathrap (1962:246) argues forcefully that diachronic and synchronic studies of ceramic variability require different kinds of classifications because of the very different nature of temporal and cultural dynamics.

The theoretically naive idea that there exists a single best classification for a given set of archaeological artifacts was incorporated into the literature on Mesoamerican ceramic analyses through the type-variety system of classification. Although Dunnell (1971b) forcefully criticised type-variety goals and methods on just this issue, his criticisms remained largely unanswered in print until Ball (1979) briefly addressed this matter. A number of Mesoamericanists, both type-variety practitioners (e.g. Matheny 1970:141; Sabloff 1975:6; Gifford 1976:4) and others (e.g. Niederberger 1976:49-54), continue to assume that a single ceramic classification can serve all purposes of analysis, even though this has been shown not to

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be the case in both theory (Dunnell 1971a, 1971b) and practice (Smith 1979a). The primary objective of type-variety classification is chronological, and the method has succeeded in developing and refining the prehistoric chronology of the Maya area. However, there is no reason to assume that those ceramic variables with temporal significance (upon which much of the type-variety system is based) will also have functional, cognitive, or other kinds of significance as well. It may be noted that ceramicists working on non-temporal problems in the Maya area are forced to abandon the type-variety system and utilize other ceramic classifications tailored to their particular goals (e.g. Fry 1979; Rands and Bishop 1980).

Dunnell has argued that Brew's (1946) call for multiple classifications for multiple goals has not been heeded by archaeologists, "because it is discomforting to the archaeologist to have one and the same set of artifacts belonging to ten different phases, or the same object assigned to ten different types" (Dunnell 1971a:168). Nevertheless, just such multiple classifications have recently been called for by one of the leading ceramicists doing type-variety analysis in the Maya lowlands:

> the way to remedy such failings [of the type-variety system] involves not the abandonment of the type-variety approach in favor of one or more alternative approaches, but rather the employment of as many as three, four or more separate and distinct methods of analysis for each corpus of material. True, the duration of the full analytical process would be lengthened immensely by this, but it seems a small price to pay for the informational increase that would accrue (Ball 1979: 829).

However, such reanalyses of ceramic collections that regularly run into the hundreds of thousands and even millions of sherds, such as those from most Mesoamerican sites, is generally not feasible given constraints of time and funding. Contrary to Dunnell (1971a:168), therefore, I would argue that the discrepancy between Brew's ideal and actual archaeological

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practice is more of a practical than a theoretical issue (see also Lathrap 1962:52).

When a single collection of ceramics is to be utilized in the study of more than one problem, an alternative to completely re-sorting and re-classifying the entire collection is to record attributes on individual sherds (usually some subset of the total sherd collection). Attributes that are suspected to be of importance in the various problems under investigation are chosen for study, and then the list of attributes by sherd can be analyzed according to different criteria for different goals; with large collections, it is most feasible to carry out these tasks by computer. This kind of attribute study makes it possible to produce different problem-specific classifications of a ceramic collection based upon a single physical study of the sherds themselves. This method is not proposed as the single best approach to ceramic classification, but rather as a practical means of overcoming constraints of time and funding without completely sacrificing theoretical rigor and relevance. Before describing how this procedure was carried out, the specific goals of the present ceramic study are outlined.

The goals of the present ceramic analysis are the following: (1) To establish a chronological sequence of phases for the Postclassic period in the area of western Morelos. The chronology is based upon three kinds of data: stratigraphy, change through time in ceramic variables, and the presence of datable ceramics from other areas. (2) To present descriptions of the ceramics from each phase which will be of use to other archaeologists working in Postclassic Mesoamerica. (3) To analyze the ceramics of each phase (or complex; see below) in such a manner as to permit inferences

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concerning the particular cultures making and using the ceramics. In addition to these chronological, descriptive, and analytical goals, the ceramic analysis will form the basis for separate studies (now in progress) of economic and political change throughout Postclassic Morelos. These studies, which are not described in the present work, concern patterns of change in external and internal trade, agricultural and craft production, settlement patterns, and overall social organization and complexity. In addition to these goals, a subsidiary task of the present ceramic analysis is to present an alternative method to the type-variety system which in its messianic fervor has begun to encroach upon central Mexican archaeology out of its Mayan heartland (see Cobean 1978:18).

Given the multiple goals of the ceramic analysis, it is clear that no single classification of the sherds will serve to meet them all. Therefore, procedures for recording sufficient data to address the various present and future goals must be designed prior to the actual intensive study of the sherds. However, the nature and extent of ceramic variability and the important aspects or dimensions of variation in a group of ceramics cannot be established in the absence of an intimate practical knowledge of the sherds themselves. The final sorting categories and list of attributes to be recorded were not developed until intensive analysis had been in progress for four or five months. Once the recording scheme was finalized, the initial ceramic collections studied had to be reanalyzed according to the standardized format.

The laboratory procedures used in sorting and analyzing the ceramics were determined by the above goals in conjunction with the requirements of available time and facilities. Sherd collections from individual provenience

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units (which ranged in size from a few sherds to over 1,000 sherds) were initially sorted into the ten categories shown in Table 13. Counts and weights were recorded for each category. Sherds in categories E and F were then put aside for attribute analysis; items in categories G through J were drawn and/or measured where appropriate (no further attributes were recorded); sherds in categories A through D were further subdivided according to the classification shown in Table 14. These undecorated sherds were classified by vessel-part and by surface finish (within the four basic form classes), and the number of sherds in each class was recorded (comals were divided into rims and bodies only). For each major form class (categories A-D in Table 13), three categories were weighed: rims, bodies and bases, and appendages. Then all rims and appendages were put aside for attribute analysis.

Definitional criteria for sorting plain body sherds into the form classes are presented in Table 15. These criteria were established on the basis of knowledge of whole and partial ceramic vessels. Postclassic incensarios are usually unfinished on both sides, although plaster is sometimes found on one or both surfaces. Comals are finished on the interior or upper surface, while the exterior is either unfinished or else deliberately roughened. Ollas are generally unfinished on the interior (although some are smoothed), except for the neck portion, which most often exhibits finish and treatment identical to or very similar to the exterior neck. Sherds finished on both surfaces were classed as ollas if they exhibited small vessel diameters and/or concave vertical profiles (most olla necks are outcurving, and few bowl or basin forms are strongly outcurving). Bowl and basin body sherds were arbitrarily distinguished by thickness. Eight

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TABLE 13

INITIAL SORTING CATEGORIES FOR CERAMIC COLLECTIONS

I. Local Non-Ritual Ceramic Vessels

Form	Undecorated	Decorated
Ollas	A	E
Basins	B	X
Bowls	C	F
Comales	D	X

II. Other Ceramic Categories

Category	Subclasses
G. Incensarios	Sahumadores; large coarse; other
H. Spindle whorls	Large; small (weights and dimensions recorded)
I. Other objects	Figurines; other
J. Non-Postclassic ceramics	Formative; Classic, Epiclassic; Colonial; modern

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TABLE 14

CATEGORIES OF QUANTIFICATION FOR UNDECORATED CERAMICS

Surface finish	Rims	Bodies	Bases	Appendages
Unslipped				
Orange slip				
Brown slip				
Smudged/slipped				
Etc.				

TABLE 15

SORTING CRITERIA FOR PLAIN BODY SHERDS

Exterior \ Interior	Unfinished	Finished
Unfinished	Incensario	Comal
Finished	Olla	<8 mm thick: Bowl ≥8 mm thick: Basin small diameter or concave profile: Olla neck

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millimeters was chosen as the dividing point, because approximately 90% of all basins (defined from rims) are 8 mm or thicker at their thinnest part, while very few bowls have widths over 8 mm. Nevertheless, the arbitrary nature of this distinction may have produced a situation where a fair number of basin bodies are classified as bowls.

Attributes recorded for all decorated sherds and all undecorated rims and appendages are listed in Table 16 (these attributes are described below). With the exception of wall thickness, these attributes were later coded for quantitative analysis, punched onto IBM cards, and entered into the CYBER-175 computer at the University of Illinois for further analysis. The quantified data from the initial collection sorting (Tables 13 and 14) were also coded and entered into a separate data file. Finally, a selection of sherds from each collection was drawn at full scale for study of vessel form and decoration.

Dimension and Attributes

Given the goals of the present ceramic analysis as stated above, two distinct kinds of classifications of the quantified sherds are required. First, quantitative variables sensitive to temporal change are needed for the seriation described in Chapter 5. Second, separate classifications of the ceramics of each phase are required in order to make cultural inferences concerning the makers and users of the artifacts. This second set of classifications will also serve for the third goal listed, that of providing ceramic descriptions for comparative use. The two kinds of classification, described in Chapters 5 and 6, both rest upon the attribute data described here. The terms dimension and attribute are defined and

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TABLE 16

ATTRIBUTES RECORDED FOR EACH SHERD

1. Provenience number
2. Sherd number
3. Decorative class
4. Form
5. Form variant (if necessary)
6. Mouth diameter
7. % of vessel opening used to measure diameter
8. Vessel height
9. Wall thickness
10. Paste attributes:
    a. Color
    b. Texture
    c. Hardness
    d. Oxidation
11. Interior and exterior surface finish (slips, etc.)
12. Interior and exterior surface treatment (polishing, burnishing, etc.)
13. Presence/absence of fire clouding
14. Appendage form
15. Appendage dimensions
16. Bowl base attributes
17. Interior and exterior rim decoration
18. Second decorative field--surface finish and treatment
19. Design motifs

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discussed more fully in Chapter 6, but my usage should be outlined at this point. A dimension is "an aspect of the subject matter which requires its own measuring device" (Spaulding 1960:438), while an attribute is a particular category or state within a given dimension. The term variable is restricted to a construct consisting of a quantified attribute or some mathematical combination of quantified attributes. These definitions are different from some schemes found in the literature on archaeological classification (e.g. Whallon 1982).

The major ceramic dimensions used in the present analysis are listed in Table 17. The following descriptions define each dimension and its constituent categories or attributes. These attributes comprise the range of variation along the dimensions which is represented in the studied corpus of Postclassic ceramics for Xochicalco. Ceramic modes for each ceramic complex consist of those attributes and combinations of attributes which were selected by the makers and users of the pottery of each time period; these are discussed in Chapter 6.

Paste Color

The dimension of paste color is broken down into six attributes. These six values were defined impressionistically to cover the range of variation observed in the ceramics; Munsell color readings were then taken on a number of sherds of each color. Orange paste is most commonly Yellowish Red (5YR 5/6; 5YR 5/8) or Reddish Yellow (5YR 6/6), while Buff paste is usually Light Yellowish Brown (10YR 6/4) or Pale Brown (10YR 6/3). The majority of the ceramics studied (86.2 percent) were of one of these two colors. A small number of sherds that appeared intermediate between

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TABLE 17

DIMENSIONS AND ATTRIBUTES UTILIZED IN THE CERAMIC ANALYSIS

Dimension	Level of Measurement[a]	Attributes
PASTE DIMENSIONS		
Color	N	1. orange 2. orange-buff 3. buff 4. brown 5. grey 6. black
Texture	O	1. very fine 2. fine 3. medium 4. coarse 5. very coarse
Hardness	O	1. soft 2. normal 3. hard
Oxidation	O	1. complete oxidation 2. partial oxidation 3. slight oxidation
FORM DIMENSIONS		
Vessel form	N	1. comals (23 forms) 2. basins (4 forms) 3. ollas (18 forms) 4. bowls (24 forms) 5. platos (5 forms) 6. other (3 forms)
Bowl base form	N	1. flat 2. elevated base 3. dimple base 4. raised-circle base
Mouth diameter	R	
Vessel height	R	

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TABLE 17 (continued)

Dimension	Level of Measurement[a]	Attributes
SURFACE DIMENSIONS		
Surface finish	N	1. unslipped 2. orange slip 3. brown slip 4. black slip 5. streaky black slip 6. mottled brown slip (smudged) 7. black smudge 8. white slip 9. red slip ("guinda") 10. black on red 11. white on red (includes black and white/red) 12. orange on red (includes black, white/red) 13. grey smudge 14. red on buff 15. black on buff 16. red on cream 17. red and black on white (polychrome) 18. red on white 19. black on white 20. red, black and orange on white 21. other color combinations on white 22. other painted decoration
Surface treatment	N/O	1. unsmoothed (rough) 2. smoothed (matte) 3. partially burnished 4. streaky burnished 5. burnished (low luster) 6. partially polished 7. streaky polished 8. polished (high luster) 9. very highly polished
Appendage form	N	1. tab handle 2. loop handle, orientation unknown 3. vertical loop handle 4. horizontal loop handle 5. solid support

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TABLE 17 (continued)

Dimension	Level of Measurement[a]	Attributes
Appendage form (continued)		6. hollow support 7. miniature solid support
Decorative class	N	A. Decorated Ollas: *[b] 1. Tlahuica Polychrome * 2. Taxco Black-on-White 3. Red-on-Buff 4. Miscellaneous Decorated Ollas B. Decorated Bowls: * 1. B-3 Polychrome * 2. B-4 Polychrome * 3. Teopanzolco imported classes[c] 4. Eroded Tlahuica Polychrome 5. Related Polychromes * 6. Guinda * 7. Graphite Guinda * 8. Morelos-Puebla Black-on-Orange * 9. Aztec I Black-on-Orange * 10. Chalco-Cholula Polychrome * 11. Toluca Red-on-White * 12. Toluca Black-on-Red * 13. Wavy Line Red-on-Cream * 14. Malinalco Polychrome * 15. Aztec III Black-on-Orange * 16. Incised Redware 17. Red-on-Buff 18. Red-on-Orange 19. Other Decorated Bowls 20. Eroded Decorated Bowls

[a]Level of measurement: nominal (N), ordinal (O), and ratio (R).

[b]Those decorative classes marked with an asterisk may be considered as "types" in the standard sense of exhibiting internal cohesion and external isolation (e.g. Cowgill 1982).

[c]The class "Teopanzolco imported classes" consists of a number of distinct decorative classes (or types) characteristic of the Teopanzolco ceramic complex of the Cuernavaca area; these are listed and discussed in Chapter 6.

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them were classed as Orange-Buff; their colors were either Reddish Brown (7.5YR 6/6) or Light Reddish Brown (5YR 6/4). Brown paste includes the colors Brown (7.5YR 4/4) and Reddish Brown (5YR 4/4); Grey paste is either Dark Grey (7.5YR 4/0) or Grey (5YR 5/1); and Black paste corresponds to the Munsell category Black (7.5R 2.5/0).

The orange and buff colors appear to represent two distinct clays that were utilized throughout the Postclassic epoch. Although they are not strongly associated with distinct decorative or functional classes (see Chapter 6), the two paste colors do show some differences in their mineral inclusions as determined by petrographic analysis of thin sections (Cyphers 1982; see below). This interpretation is tentative, however, because the buff color could represent a reduced version of the orange clay (Shepard 1956:103-107); this may be tested in the future by refiring selected buff sherds. The other three colors--brown, grey and black--most likely represent a scale of either increasing reduction or decreasing oxidation of the basic two clay colors.

Paste Texture

This dimension is represented by an ordinal scale based on subjective judgments of fineness and coarseness in terms of the amount and size of aplastic material (temper) in the clay. The validity of the scale is indicated by the petrographic study of Cyphers (1982), where fine paste sherds (attribute 2) contain an average of 8.2 percent inclusions; medium (attribute 3) average 12.3 percent; and coarse sherds (attribute 4) average 13.3 percent inclusions. Very fine and very coarse sherds are rare and none were included in the petrographic analysis.

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Paste Hardness

This dimension was arranged to keep track of sherds that were considerably harder or softer than average, as measured by the effort necessary to break off a corner of the sherd with pliers (done in every case in order to examine the paste macroscopically). As such, it is a crude scale and might not correlate well with absolute hardness measured by Mohs scale. Nevertheless, some significant associations of "harder" paste with other dimensions are evident (see Chapter 6).

Oxidation

"Fully oxidized" sherds (attribute 1) exhibit a uniform color throughout the profile. "Partially oxidized" indicates the presence of a dark grey or black core in the center of the vessel wall, and in "barely oxidized" sherds, the dark core covers approximately 80 percent or more of the sherd width (as long as there is some trace of non-black paste color along the surface). Many of the examples of black-colored paste probably comprise a fourth oxidation attribute, "non-oxidized." However, since it could not be determined by inspection whether the black color resulted from non-oxidation of carbonaceous clay, smudging, or reduction (see Shepard 1956:219) these sherds are not scored on the oxidation dimension.

Temper

Initial macroscopic inspection suggested that virtually all of the Postclassic ceramics analyzed contained sand temper, and for this reason temper was not recorded as a separate dimension. Subsequent petrographic

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analysis of 55 thin sections of Postclassic ceramics from Morelos (including 25 samples from El Puerto) indicated that most of the rock and mineral inclusions in the paste are sharp angular grains without evidence of weathering, and were thus probably indeed added to the clay as temper (Cyphers 1982). On the other hand, some of the inclusions such as detritic carbonates exhibit erosion and may thus represent natural clay minerals; these are the inclusions that differentiate the orange and buff paste colors. Cyphers (1982) divides the 55 sherds into four paste groups: (1) basalt-andesite; (2) basalt-andesite and quartzite; (3) basalt-andesite and quartzite with carbonates; and (4) basalt-andesite and quartzite with schist. Only one example of the fourth group is present (a trade sherd from Guerrero; see Chapter 6). The first three groups show little or no consistent associations with paste color, vessel form, or other dimensions, and their significance is not clear.

Vessel Form

The form of a ceramic vessel can be either simple or complex in terms of its geometry and the number of dimensions needed for adequate description. A number of non-typological, modal studies have been carried out on the archaeological and ethnographic ceramics of the Upper Amazon, where vessel forms tend to be quite complex. These studies require ten or more dimensions to handle the complexity of vessel form in this area (e.g. Lathrap 1962:249ff; Raymond, DeBoer and Roe 1975:6f; DeBoer and Lathrap 1979:168f). In contrast, the Postclassic ceramics of central Mexico tend to be conservative in their variety and elaboration of form; the present study uses only five dimensions to describe the shape and size

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of vessels. Of these, the first, "vessel form," is by far the most important dimension, while the others are present in only a small proportion of the total sherds.

The dimension of vessel form is divided into four Form Classes: ollas, basins, bowls, and comals; the few ceramic vessels not fitting clearly into one of these classes are grouped as "other." Each form-class is further subdivided into a number of forms, which are illustrated in Appendix A. The forms were defined from actual sherds, and do not represent a generalized classification meant to be applicable to ceramic assemblages outside of Postclassic Morelos. The gaps in the form numbering sequence represent forms found in other Postclassic complexes of Morelos, which will be described and analyzed elsewhere (Smith n.d.); the full form chart may be found in Smith (1981b). The criteria used in deciding when to define a new form was based more on a "splitting" than a "lumping" philosophy. This was done for two reasons: first, distinct forms can always be lumped at a future time (as they are here in the form sub-classes discussed below), whereas the reverse is not possible. Second, the single vessel form dimension includes the potentially independent dimensions of lip treatment, rim modification, and body form; in order to take these factors into account, the number of basic forms must be relatively large and precisely defined. The inclusion of these other axes of ceramic variability under a single dimension was based upon the nature of forms in Postclassic Morelos. Almost all vessel lips are rounded to slightly tapered, as the form chart shows. Non-direct rims are not sufficiently abundant to warrant a separate dimension of classification, and their inclusion as distinct forms does not expand the form chart excessively (e.g. bowl Forms 325, 326 and 327 are

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identical to Forms 317, 318 or 319, but with everted rims of varying shapes).

Because of the rarity of whole or partial vessels available for study, complete vessel form is available for only a small proportion of the ceramics analyzed. For this reason, the forms are defined to incorporate as much of the total vessel shape as possible, and in order to implement such a scheme, several levels of completeness are necessary. The most general level of form completeness is represented by Forms 104-107, 204-207, 304-307, and 404-407. These forms are assigned to fragmentary rims that can be oriented correctly (whereas fragmentary rims that cannot be oriented are classed as "unknown"; Forms 100, 200, 300, and 400). Within the ollas, most forms cover only the neck portion of the vessel, and the basin rims rarely extend as much as one-half or one-third of the height of the vessel wall. More complete form determinations are often possible with bowls, a number of whose forms cover the entire vessel wall from rim to base. Varying levels of completeness are included in the bowl forms. For example, Forms 317 and 318 are distinguished by the shape of the wall-base juncture; sherds of this general form ("conical") but lacking the base angle are classed as Form 319. Bowl bases exhibit some variability, and are treated as a separate dimension below. Comal forms in Postclassic central Mexico are quite standardized in general configuration--shallow concave vessels with roughened or unfinished undersides--but are quite variable in their rim shape. All comal forms (except for 404-407) include the entire rim up to the point where the roughened exterior surface starts. When a rim approximated but did not replicate a specific form, it was classified as a variant of that form; these are distinguished by a "V" after their form number.

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Olla, bowl, and comal forms are grouped into form subclasses for purposes of analysis and comparison. This is done for two reasons. First, the large number of forms and small overall number of rim sherds produce a situation where most forms are rare; combining them yields categories with greater frequencies for easier comparisons. Second, the subclasses allow investigation of various additional dimensions of form which are embedded in the overall form classification.

The five form subclasses are listed in Table 18. Ollas are classified here along two dimensions that may be considered as ordinal scales. The first, which measures the degree to which the rim is outcurved, ranges from 1 (vertical; no curvature) to 5 (maximum outcurved). The second olla scale measures the relative height of the neck above the body junction; it ranges from 1 (low neck) to 3 (high neck). Bowls are classified into eight nominal general form categories, such as hemispherical, everted rim, plato, and so forth. Comals are divided into general form categories and also classified according to the angle of elevation of the rim above the horizontal plane; this latter variable ranges from 1 (horizontal rim) to 4 (maximum elevation angle). Comal forms were classified as follows: (1) angle less than 11 degrees; (2) angle between 11 and 22 degrees; (3) angle between 22 and 33 degrees; (4) angle greater than 33 degrees. In addition, the break-angle of comal rims is classified into six ordinal categories (from no break to sharp break) described in Chapter 5; this variable is used in the seriation but not in the ceramic descriptions of Chapter 6. The classification of each individual form on the relevant subclasses is given in Appendix A along with the form chart.

The definition of the four major form classes combines general

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TABLE 18

FORM SUBCLASSES

Subclass	Measurement[a] Level	Attributes[b]
Olla Rim Curvature	O	1. vertical 2. 3. medium 4. 5. outcurved
Olla Neck Height	O	1. short 2. medium 3. long
Bowl Form Subclass	N	1. outcurved 2. incurved 3. hemispherical 4. conical 5. straight flaring 6. everted rim 7. recurved wall
Comal Form Subclass	N	1. no ridge 2. rounded ridge 3. tapered rim 4. outcurving 5. pronounced break angle 6. direct rim
Comal Rim Elevation Angle	O	1. flat (horizontal) 2. 3. 4. high rim

[a]Measurement level: nominal (N), ordinal (O).

[b]Classification of the forms on the appropriate attributes and illustrations are in Appendix A.

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practice in the area of Mesoamerican ceramic studies and specific characteristics of the Postclassic ceramics of Morelos. An olla is a necked globular vessel with a restricted opening. A bowl is an open vessel whose height is greater than 1/5 of its diameter (this includes both the bowl and dish forms used in some studies), while a plato is an open vessel whose height is less than 1/5 of its diameter (see Parsons 1966:126f; Ball 1980: 4). Because of the general rarity of platos and the inability to distinguish bowl and plato body sherds, the latter is treated here as a subclass of the bowl form. There are thus no body sherds classified as platos, but certain rims are so designated (Forms 360 to 369). Although considered a bowl subclass here, the plato is singled out in Chapter 6 as a distinct form class. Basins are bowls (according to the above definition) whose diameters are larger and wall thickness is greater than most bowls, and which exhibit certain characteristic rim forms (almost always everted). Nearly all vessels classified as basins have diameters greater than 27 cm, and they have walls over 8 mm in thickness; this latter characteristic was used as the criterion for separating bowl and basin body sherds in the laboratory. These characteristics of basins were initially established in the study of ceramics from the Teopanzolco ceramic complex, where the form is fairly common. Basins are rarer at Xochicalco, but extension of the Teopanzolco definition to this site was simple and straightforward. Finally, comals are shallow open vessels whose exterior surface is either unfinished or deliberately roughened. These four form classes are basic to the Postclassic ceramic complexes of Morelos, and their functional and cultural significance are treated in greater detail in Chapter 6.

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Bowl Base Form

A number of attributes of bowl base form were distinguished. These include: "dimple bases" (a limited area in the center of the base is sharply but smoothly elevated), "raised bases" (a gradually rising convex base, most of whose bottom surface is slightly raised above the horizontal plane), "elevated circles" (a circular area is raised above the floor of the interior base, but is not visible on the exterior), and flat bases. The majority of bowls exhibit a simple flat base.

Mouth Diameter

Vessel mouth diameter was measured with a pipe fitting size chart to the nearest centimeter for all rims comprising approximately 5% or more of the mouth circumference (the larger the diameter of a vessel, the smaller the percentage of the opening needed for an accurate diameter measurement). As a check on the accuracy or confidence of this measurement, the actual percent of the mouth was also recorded for each rim measured. This latter information was coded into the data file as an ordinal scale of five values, from 1 (maximum accuracy--measured from a complete vessel) to 5 (minimum accuracy--based on 5% or less of the mouth).

Vessel Height

This measure was recorded to the nearest millimeter for those (few) vessels complete enough to determine height.

Wall Thickness

Thickness of the vessel wall in millimeters was measured by sliding calipers for all sherds subjected to attribute analysis. Preliminary study

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indicated that this value had little chronological or cultural significance (outside of separating bowls and basins), so these data were not included in the data file.

Surface Finish

All sherds exhibited either unslipped, slipped, painted, or eroded surfaces. Presence of a slip was determined primarily through color contrast between the ceramic surface and the paste, although other factors such as the flaking off of slip fragments were also relied upon (see Shepard 1956:191-193). These judgments were not checked microscopically (although a 10-power hand lens was sometimes used), and in some cases there may be a fair degree of uncertainty in the slipped/unslipped distinctions. The contrast between orange and brown slip is somewhat arbitrary, as these colors grade into one another. The distinction could often be made confidently, however, so the two attributes were retained as separate categories. Orange slip colors run from a light orange (Reddish Yellow, 7.5 YR 6/6) to a dark color (Dark Red, 2.5 YR 3/6), with most examples being in the middle of this range (e.g. Yellowish Red, 5 YR 4/8; Red, 2.5 YR 4/8). The reddest oranges are Red (10R 4/8), while the most yellow are Reddish Yellow (7.5 YR 6/6). Brown slip colors run from a light value of Light Yellowish Brown (10YR 6/4) through a midrange of Brown (7.5YR 4/4; 7.5YR 5/4), to a dark color of Dark Reddish Brown (5YR 3/3).

Black slips are quite distinct (Black, 7.5R 2.5/0) in the Postclassic ceramics of Morelos. They often show signs of having been unevenly applied, and are sometimes quite thick. This attribute is usually easily distinguishable from the black smudged finish described below. Although

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none of the black material was subjected to chemical analysis, the color is probably a mineral pigment (and thus not technically a slip, although such mineral pigments may be mixed with a ceramic solution or slip). These black pigments appear in the Basin of Mexico for the first time in the Postclassic epoch, and Branstetter-Hardesty (1978:140f) suggests that these may have been produced by either the reduction of a red iron oxide, or by oxidation of CuO or MnO_2. Streaky black is a rare but distinctive surface finish attribute which may find parallels in the Postclassic Basin of Mexico. Branstetter-Hardesty (1978:141f) notes that at Cerro Portzuelo, the "black pigment did not adhere well to the clay surface and did not take burnishing." This situation could account for the presence of this attribute in the Morelos ceramics, where the black streaks sometimes look like they are the remainder of a formerly totally black surface, while other examples appear to represent a direct but incomplete application by a brush or other implement.

Mottled brown is the name given to a surface color produced by the partial or incomplete smudging of an orange slip. The surface is mostly a light brown (e.g. Dark Reddish Brown, 5YR 3/2, 3/3, 3/4), with irregular dark and light patches. Occasionally the same bowl (this technique is not found on other forms) has irregular zones of orange slip, mottled brown, and black smudging. This finish is quite distinct from the simple brown slip category described above. The black smudge attribute is assumed to cover a slipped surface, although this may at times be problematic (Shepard 1956:192f). The smudging often does not cover the entire vessel, and where this is the case, a slip is usually visible at the edge. This attribute is distinguished from the black slip by its greater uniformity of color and

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texture, by commonly-present areas of incomplete smudging, and by the penetration of the black color into the body of the sherd when viewed in cross-section. Even where the smudging does not cover the entire vessel surface, it appears to be the result of deliberate application and not an accident of firing. White slip is generally rare outside of the decorated ceramics, and many of the sherds classified as white slipped may actually represent portions of polychrome vessels. However, there would appear to be at least a small number of non-decorated white-slipped vessels, particularly among the ollas; polychrome ollas exhibit few if any expanses of white color among the dense decoration, and some of the white slipped sherds are quite large. The color includes White (10YR 8/2) and Light Grey (10YR 7/1), with a few slightly darker shades (referred to here as cream-colored) such as Very Pale Brown (10YR 7/4).

The color red in attributes 9 to 13 refers to that which forms the basis of the "redwares" or "guinda" ceramics of Postclassic central Mexico. The most prevalent color is Dark Red (7.5R 3/6, 3/8); two shades of Red (7.5R 4/8 and 10R 4/6) are also common. Occasional sherds are a deeper, maroon-like color corresponding to Dusky Red (7.5R 3/4 and 10R 3/3). The black and white colors which are often painted on the red surfaces have the same Munsell designation as those discussed above. Attribute no. 11 includes black and white on red in addition to white on red, and no. 12 denotes orange decoration with varying combinations of black and/or white on red (the orange shade is Red, 2.5YR 4/8). Attribute 13, grey smudged, refers to a characteristic dark reddish-grey color produced by the deliberate smudging of a guinda finish; Munsell readings were not taken on this color. Some imported guinda sherds are painted with

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a graphite black color; this color corresponds approximately to Dark Grey (7.5R 3-4/0). The use of graphite in this pigment has been confirmed by chemical analyses (Wanda Tommasi, personal communication); this color is discussed further in Norr (n.d.).

An attempt was initially made to separate painted decoration on unslipped buff colored surfaces (attributes 14 and 15) from decoration painted on a buff or cream colored slip (attribute 16). The former corresponds to Light Yellowish Brown (10YR 6/4), while the latter is a slightly lighter shade, either Light Brown (7.5YR 6/4) or Reddish Yellow (7.5YR 7/6, 6/6); the red color of the designs is generally Dark Red (7.5YR 3/6), while the black color occasionally found is 7.5R 2.5/0. In practice, however, these two categories are often difficult, if not impossible, to distinguish macroscopically. This situation, coupled with the fact that the same patterns of decoration appear to occur on both slipped and unslipped buff colored surfaces, led to a combining of the two sets of attributes into the single "red-on-buff" (including black at times) attribute for the definition of decorative classes. Nevertheless, initial judgments as to the presence or absence of a slip on these sherds are retained in the data file and in the descriptions in Chapter 6.

Attributes 17 through 21 correspond to variations in the basic polychrome painting technique common to Morelos and the Toluca Valley in Postclassic times. This technique consists simply of red and/or black (and occasionally orange) designs painted over a white slip or paint. None of these ceramics exhibit the technique of "laca" polychrome, notwithstanding statements to the contrary by Piña Chán (1956/57:123), Noguera and Piña Chán (1956/57:152-154), Chadwick (1971:247) and Galván

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(1974/75:79). As first defined by Noguera (1954:138ff), the technique known as "laca" consists of polychrome decoration on an orange slip which has been applied over a previously fired white slipped surface. This orange over white technique, obviously not a true lacquered surface (see Castillo Tejero 1975:7f), characterizes much of the Postclassic polychrome ceramics of Cholula (Noguera 1975:169f) and Chalco (O'Neill 1962:66ff), but is not found in Morelos except on trade pieces. The colors utilized in the Morelos and Toluca polychromes (attributes 17-21) are white (White, 10YR 8/2); light grey (Light Grey 10YR 7/1), black (Black, 7.5R 2.5/0), red (Dark Red, 7.5R 3/6) and occasionally orange (Red, 2.5YR 4/8). Orange painting is found only in wide or narrow bands or occasionally in discreet motifs; as stated above, it is never found completely covering a decorative zone as in the "laca" technique. Attribute 22 is a catch-all category for the rare decorative paint combinations not falling into attributes 9 through 21; it was decided to analyze the decoration on these few sherds by hand rather than expand the surface finish code excessively.

Surface Treatment

This dimension is divided into nine nominal classes, at least some (and probably all) of which may be considered an ordinal scale of luster. Behavioral labels which may or may not be correct have been given to the nine attributes (see Table 17); however, the defining criteria are empirical and straightforward, and thus the classification stands independent of the correctness of the behavioral labels. An unsmoothed surface is rough and shows no evidence of wiping or smoothing; this attribute is rare, and is found mainly on comal exteriors (which may have been intentionally

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roughened) and incensarios. A smoothed surface may be described as matte or non-lustrous; it often shows evidence of the material used to smooth the vessel (cf. Shepard 1956:189, figs. c,f). A burnished surface (attribute 5) has a low but definite luster, most likely produced by a limited amount of polishing (see Branstetter-Hardesty 1978:139), while a polished surface has a high luster, probably the result of considerable polishing. Attribute 9 is a rare category referred to as very highly polished; it has a very high luster. These five attributes (numbers 1, 2, 5, 8, and 9) comprise an ordinal scale of the degree of luster on a ceramic surface, and differences along this scale are phrased in terms of the degree of polishing evidenced. In addition to these attributes, four categories are added which appear to fit into the scale, although the resulting scale is not as consistent as are the five main attributes taken alone.

Partially burnished (attribute no. 3) and partially polished (no. 6) refer to surfaces which are respectively burnished and polished in some parts but not others. The zonation of the matte areas between the burnished or polished areas is irregular, and the technique of pattern burnishing (or polishing) is not present in the Postclassic ceramics of Morelos. Streaky burnished (no. 4) and streaky polished (no. 7) refer to surfaces of low and high luster respectively which exhibit low troughs and ridges produced by the tool used in finishing. The resulting nine attribute scale is not precisely an ordinal scale in degree of luster, but it approximates such a gradient, and does appear to represent an ordinal scale in terms of the effort or time invested in finishing the ceramic surface. Accordingly, a measure referred to as the "Surface

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Treatment Index" (S.T.I.) is used in Chapter 6 to compare surface treatments of various classes and forms. It is calculated by multiplying the attribute score (1 to 9, unfinished to very highly polished) by the number of examples of that attribute for each attribute present in a given class, then summing the products, and finally dividing by the total number of sherds scored on surface treatment for that class. It thus represents a weighted average summarizing the degree of polishing of a given class of vessels.

Appendage Form

Four categories of handles and three of supports are represented in the Xochicalco Postclassic ceramics. Tab handles consist of solid rounded horizontal tabs or lugs found on basins. Attributes 2-4 are loop handles, or any handle, circular or oval in cross-section, which is attached to a vessel at both ends. "Strap handles," which exhibit an elongated oval cross-section, are not found in these ceramics. Loop handles are distinguished by the orientation of the long axis of the handle; the three attributes are horizontal, vertical, and indeterminate. Orientation was determined by examination of the finishing marks on the vessel interior, general curvature of the vessel, and the angle that the handle makes with the vessel wall. Supports are relatively rare, and almost always fragmentary, so only three classes are distinguished for these items: solid, hollow, and a distinctive miniature solid support. Appendage size was measured to the nearest millimeter with sliding calipers. Length of supports was measured (if possible), while two cross-sectional measurements were made on the loop handles, plus a length measurement if possible.

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Decorative Classes and "Types"

The realm of painted decoration is perhaps the most difficult aspect of ceramic variability to quantify. The most useful procedure might be to analyze decoration along as many independent dimensions as possible. Each sherd or vessel could be scored on dimensions such as colors used for decoration and background, motifs, combinations of motifs, width of painted lines, design layout, size and structure of decorative fields, and a number of other axes of variability. With such a data base, individual dimensions or combinations of dimensions could be singled out for various chronological, cultural, or other studies. In the present case, such fine-grained cross-classification of painted ceramic decoration did not seem warranted. The requisite time was not available, but more importantly, Postclassic production of painted ceramics appears to have been sufficiently standardized such that decorative "types" or clusters of very similar ceramics clearly stand out upon visual inspection of the ceramic collections. For this reason, discussion and analysis of the decorated ceramics is presented in terms of decorative classes, defined on the basis of decoration alone. Within each decorative class, design is analyzed in terms of decorative fields and zones, colors, motifs, and overall decorative pattern.

Nineteen of the 25 decorative classes represent clear clusters of attributes of color, motifs, design structure, and so forth, and may thus be regarded as decorative "types" in the standard sense that they exhibit internal homogeneity and external isolation with respect to other classes at the same level (see for example Cowgill 1982); those decorative classes

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which may be considered as types are indicated in Table 17. Significant associations exist between these types and various attributes of form, paste, and appendages; these are discussed under the appropriate ceramic complex in Chapter 6. It should be emphasized that the decorative classes are defined in terms of dimensions of decoration only; the "types" referred to are decorative types whose definition is independent of dimensions of form, paste, etc. The decorative classes which are not types are less standardized categories whose definitions are based solely upon the colors used and the form class employed. A number of imported decorated classes were not subjected to attribute analysis because of their small sample size and adequate description elsewhere in the literature (e.g. Aztec III Black-on-Orange, Chalco/Cholula Polychrome, Fine Orange); these are described here by ceramic complex where appropriate, but are not included in the attribute data file.

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Notes

[1]The Xochicalco Mapping Project was carried out as part of the larger Proyecto Coatlan del Rio, directed by Jorge Angulo Villaseñor (see Hirth and Arana 1978). The 1977 excavations at Xochicalco were funded by the National Science Foundation (grant number INT-77-02030); the author's participation during that season was supported by the Department of Anthropology, University of Illinois.

[2]The excavations described here were conducted by Barbara Borg and Deborah Rhead. While the author participated in the 1977 Xochicalco Mapping Project excavations, he worked primarily in the Epiclassic excavations and not the Postclassic areas reported here.

[3]In this and all other cases where ceramics excavated and recovered separately are lumped into a single unit for quantitative analysis, the lumping was done after the data were recorded. Thus it is still possible to study the ceramics from Capa I separately from those of Capa II in each pit of Excavation B. Separate deposits are combined only if they meet both of the following criteria: (1) the combination does not violate stratigraphy; and (2) the ceramics from the individual collections are very similar and obviously belong to the same ceramic cmplex.

[4]This soil change at 40 cm in pit D1, as well as a change at 30 cm in pit D3, was observed during excavation and a new capa begun. However, they do not appear in the excavation profiles, which were drawn later by another archaeologist. I have drawn the capa changes in my profiles in accordance with the field notes of the original excavator.

[5]Material from 20 to 60 cm of pit D2 was removed in five separate units, bagged separately with consecutive bag numbers. No information is given in the notes or catalog on the precise vertical provenience of these five bags, however (they all say 20-60 cm).

[6]Full descriptions of the Terrace 85 burials must await study of the skeletal material. My burial descriptions contain only those observations necessary to provide a context for the associated ceramics and their depositional history.

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CHAPTER 5

SERIATION OF POSTCLASSIC DEPOSITS AT XOCHICALCO

Initial 1980 Postclassic Chronology for Morelos

During laboratory analysis of collections of Postclassic ceramics from various parts of Morelos, an initial chronological scheme was developed for the archaeologically-known portions of the state (see Smith 1981a, 1981b). This chronology was organized around the concept of the ceramic complex, which may be defined as "the sum total of associated ceramics which has a convenient and easily distinguishable geographical and temporal meaning" (Willey, Culbert and Adams 1967:364); or alternatively, "any series of ceramic features . . . which share the same pattern of horizontal and vertical distribution through a series of stratigraphic cuts" (Lathrap 1962:48). Three distinct ceramic assemblages from the single-component sites of Tepozteco, Teopanzolco, and Tetla were identified as separate ceramic complexes. These three complexes may be approximately dated to a Middle Postclassic time period based upon: (1) Early Aztec trade places from the Basin of Mexico; (2) radiocarbon dates at Tetla (Norr n.d.); and (3) cross ties among the three complexes (see Table 19). The Cuauhnáhuac complex was defined on the basis of ceramics excavated from the final Prehispanic levels (beneath Colonial deposits) at the Palacio de Cortés in downtown Cuernavaca; in several of the Palacio pits Cuauhnáhuac ceramics were found to lie stratigraphically above ceramics of the Teopanzolco complex. Excavated deposits from Las Pilas and Olintepec

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TABLE 19

POSTCLASSIC CERAMIC COMPLEXES OF MORELOS: INITIAL CHRONOLOGY OF 1980 (SINCE REVISED)

	PERIOD	WESTERN MORELOS	CUERNAVACA	TEPOZTECO	SOUTHEASTERN MORELOS	VALLEY OF MEXICO
1519	LATE POSTCLASSIC	C U A U H N A H U A C		?	TLALNAHUA	LATE AZTEC
1350	MIDDLE POSTCLASSIC	TEMAZCALLI	TEOPANZOLCO	TEPOZTECO	TETLA	EARLY AZTEC
1150	EARLY POSTCLASSIC	TILANCINGO	?	?	(MAZAPAN??)	MAZAPAN
950	EPICLASSIC	PHASE G	?	?	(COYOTLATELCO?)	COYOTLATELCO
750						

in Eastern Morelos were examined briefly in 1980 and 1981. The final Prehispanic levels at these sites contained decorated wares distinct from the earlier Tetla complex ceramics, so these Late Postclassic materials were called the Tlalnahua complex. Until analysis of these ceramics by their excavators (Arquéologas Guadalupe Martínez and Wanda Tommasi) is completed, however, this complex remains very poorly defined.

At Xochicalco, the top levels of several pits contained ceramics very similar to those of the Cuauhnáhuac complex in Cuernavaca, so these were assigned to the same complex. The post-Epiclassic sequence of the Tilancingo-Temazcalli-Cuauhnáhuac phases was observed in several pits (see Chapter 4), although a number of deposits could not be easily assigned to a complex. While the three-phase Postclassic chronology at Xochicalco appeared to be relatively well-established upon completion of laboratory analyses in 1980, two factors called for further fine-grained analysis of the sequence. First, it was not clear in many cases how to align the Postclassic deposits of the various excavations; second, a finer subdivision of the Postclassic period was desired in order to address processual change with greater precision. Specifically, it was hoped that further analysis would enable the final phase to be broken down. Native historical data document the conquest of Morelos by the Triple Alliance in approximately A.D. 1438 (see Chapter 3), which falls in the middle of the Cuauhnáhuac phase (ca. A.D. 1350-1519). Unless this phase can be split into two temporal periods, it is impossible to study archaeologically the effects of conquest upon the cultures of Morelos. With these two goals in mind--correlation of separate stratigraphic sequences, and the refinement of the 1980 three-phase chronology--a

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computer seriation of the Xochicalco deposits was undertaken.

Quantitative Seriation: Assumptions and Methods

In his discussion of archaeological seriation, Dunnell (1970) makes a useful distinction between technique and method. Seriation technique may be defined as:

> any technique for arranging a set of entities into a sequence such that, starting from any specific entity, the other entities most similar to it are closest to it in the sequence, and similarly decreases monotonically as one compares entities progressively more distant in the sequence (Cowgill 1972:381).

Seriation technique, as a means of establishing a unidimensional representation of entities, is a subset of general scaling techniques. Its applications are not limited to archaeology, and seriation techniques have recently been utilized in psychology and other fields as well (Hubert 1974; Shepard 1974; Carroll and Arabie 1980:617), On the other hand, the method of seriation, following Dunnell, consists of certain archaeological criteria which must be satisfied if the formal ordering of a seriation is to be interpreted as a chronological ordering.

Dunnell's (1970:312-316) three conditions for inferring chronology from a seriated sequence are:

(1) All units must be of comparable duration.

(2) All units must belong to the same cultural tradition.

(3) All units must come from the same local area.

As Marquadt (1978:297) points out, a more reasonable version of the first criterion is Cowgill's (1972:385) stipulation that the durations of two seriated units be considerably smaller than (or at least not much greater than) their time difference. Dunnell's second point was stated first by

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Rowe (1961:326f; see also Rouse 1967:173-177) and stipulates that the time span covered by a seriation does not include any abrupt and drastic breaks in the sequence (see Cowgill 1972:384). The third criterion was first expressed by Ford (1962:41; see also Rouse 1967:177-179) and describes the need to eliminate spatial or geographical variability from the seriation. The correct arrangement of entities along the dimension of time, the goal of archaeological seriation, is most efficiently achieved if other dimensions of the data are controlled for. Limiting seriated units to a single local area controls for the spatial dimension, while the various components of the formal dimension of archaeology (see Spaulding 1960) are best controlled through selection of the kinds of units to be seriated and the variables to be used in the seriation of the units.

Although Rouse (1967:165) lists seventeen kinds of archaeological units that may be seriated (e.g. graves, monuments, buildings, artifacts, grave lots, caches, cemetaries, seasonal sites), most seriations are based upon either grave lots or refuse deposits. While grave lots are often ideal units for archaeological seriation (see, for example, Menzel, Rowe and Dawson 1964), discussion here is limited to seriation of refuse deposits. Burials with associated Postclassic ceramics in Morelos are too few for formal seriation, although they are important as sources of other ceramic and chronological data. In seriating refuse deposits, a major consideration is the comparability of the collections utilized. If collections represent deposits of a specialized material (for example, primary refuse from limited activity areas), then variability between units can have a functional dimension in addition to or even in place of a temporal dimension (see Brown 1975:160-163). Unless all of the seriated units represent the

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same kind of specialized deposit (e.g. burials), the units will not be comparable and it will be difficult to isolate temporal variation and establish a successful seriation.

The solution to this problem of comparability among deposition units lies in the utilization of secondary refuse deposits for chronological seriation. As discussed in Chapter 4, secondary refuse is characterized by its high diversity and density of materials, and by the worn-out nature of the materials (Schiffer 1976:30). Of the different kinds of archaeological deposits, secondary refuse most closely approaches an adequate sample of the range of preservable artifacts that were in use at a given time, thereby eliminating the problem mentioned by Brown (1975: 160-163) of trying to study change through time between possibly different, specialized activity areas. Also, the high variability present in the artifacts of secondary refuse deposits allows the archaeologist to select those variables most sensitive to temporal change and, thus, most appropriate for seriation.

There are three considerations which must be dealt with in choosing appropriate (i.e. time-sensitive) variables for seriation. First, the taxonomic level of the variables must be decided upon; traditionally this has involved a choice between attributes and types. Second, the kind of variables to be employed must be made explicit; this will be framed here in terms of the distinction between the stylistic and functional properties of archaeological variables. Third, the distributional qualities of the variables must be considered; this involves choosing variables which change through time in some specific fashion compatible with the particular seriation technique employed.

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Taxonomic Level

Ford's original formulation of quantitative seriation (Phillips, Ford and Griffin 1951; Ford 1962) was based upon changes in the percentage of ceramic types through time. From Robinson's (1951) landmark transformation of Ford's visual technique into a purely numerical algorithm to the latest developments in computer seriation (e.g. Ester 1981), reliance upon types has been the hallmark of this class of techniques (see Marquardt 1978:226-282 for a review of the history of quantitative seriation). Even when techniques make use of occurrence data (presence/absence) in place of abundance data (counts, percentages, etc.), the categories under study are types rather than attributes (e.g. Cowgill 1972; Ester 1981). It is only recently that quantitative seriation practices have departed from the traditional preoccupation of American archaeologists with typological analysis. That this departure was so long in coming is surprising given that the superiority of attributes over types for chronological analysis was pointed out over twenty years ago (Rowe 1959; 1961) albeit in the context of qualitative (non-quantitative) seriation. Rowe's arguments were largely ignored in the literature on both quantitative techniques and seriation in general, where several authors argue for the superiority of types over attributes or modes in seriating archaeological data (e.g. Rands 1961; Rouse 1967:171). The many successful applications of qualitative seriation on the level of the attribute (e.g. Menzel, Rowe and Dawson 1964; Lathrap 1962; Isbell 1977; Kennedy 1981) have gone largely unacknowledged in the literature on quantitative seriation (e.g. Marquardt 1978), in spite of the fact that recent non-typological quantitative techniques converge in several respects with the qualitative methodology of Rowe, Lathrap, and

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their students.

The first non-typological quantitative seriation techniques were presented by LeBlanc (1975), who called his method "microseriation." LeBlanc classified pottery collections from the Cibola region of New Mexico along six dimensions: vessel form, ware, slip pattern, paint type, red slip hue, and painted line width. Each of the first five dimensions was represented by two, three, or four attributes, while line width was recorded as a metric value. For every collection, percentage values were calculated for the attributes within each dimension, and these values formed the basis for calculation of several sets of similarity coefficients between each pair of collection units. Similarity matrices were calculated separately for each dimension, and a combined matrix using all attributes was also calculated. These matrices were then seriated by multidimensional scaling, yielding a final ordering judged to be successful based on: (1) knowledge of long-term trends in Cibola pottery styles; (2) stratigraphy; and (3) extension of the seriation to nearby dated sites. LeBlanc justifies his analysis at the level of the dimension or attribute in place of the traditional level of the type as follows:

> Seriating by attributes alone, of course, ignores the associational aspects of the data. The non-random association of attributes reflects cultural behavior and one dislikes ignoring it. However, in practice the fact that attribute seriation will sometimes work where typological seriation will not is a most compelling reason to employ it (LeBlanc 1975:26).

In this final statement, LeBlanc is rediscovering what Rowe demonstrated twenty years ago, i.e. that attributes often produce a finer chronological sequence than do types, if only because there are many more attributes than types to consider in any given ceramic collection.

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In spite of the findings and recommendations of Rowe, LeBlanc and others, the decision as to what taxonomic level will be used in a chronological seriation is more a practical and empirical matter than a theoretical issue; if attributes work better than types, then they ought to be used. However, it may be the case that in a given situation, some combination of attributes and types will produce the best ordering. It is not surprising, therefore, that the next published advance in non-typological quantitative seriation (Drennan 1976a; 1976b:45-69) employed such a mixture of variables from distinct taxonomic levels. Drennan first classified the Middle Formative ceramics of Fabrica San Jose (Oaxaca, Mexico) into seven mutually exclusive types (which he calls wares), and then subdivided the types by twelve vessel form categories; of the eighty-four possible combinations, only 36 were actually represented in Drennan's material. The frequencies of these 36 classes for each collection form the first of four "subsets of ceramic data" used by Drennan in his seriation. The other three subsets consist of attributes (such as rim form, wall angle, incising, design motif, etc.) that were studied separately for each of the three most common type-form classes previously defined. These four subsets--one comprised of typological variables and the other three of nontypological variables--were then used to compute similarity coefficients between units. Based on the similarity coefficients, the technique of multidimensional scaling was used to order the units. Drennan's results are quite good, and he succeeds in refining the Middle Formative ceramic chronology of the Valley of Oaxaca with his seriation.

A third example of recent non-typological quantitative seriation is

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that of Marquardt (1978:289-292), who proposes that the best variables for seriation are ratios of counts or measurements:

> . . . the elements are logically independent ratio-scale variables calculated for each unit. Independent ratio-scale variables are not required to sum to 1 or to 100% for each unit. Unlike percentages (Speth and Johnson 1976:48f), ratio-scale variables are amenable to analysis by pattern-sensitive similarity coefficients, such as Pearson's r. . . . Such variables also have the advantage of flexibility, because one can construct them at several levels of analysis: assemblage, type, mode, etc. (Marquardt 1978:261).

As Marquardt notes, problems can arise in the calculation of correlation coefficients from percentage data; the variables are not independent, and a certain number of negative correlations are built into such procedures (Speth and Johnson 1976:48f; although see Cowgill 1968a:372 for a different view). These problems only arise when percentages sum to 100%, however. Thus it is perfectly valid in correlation analysis to use some ratios which happen to be percentages (e.g. the ratio of orange-slipped ollas to total ollas) as long as corresponding values adding to 100% are not also part of the analysis (e.g. non-orange-slipped ollas).

The history of types and attributes in quantitative seriation may be summarized as follows. Ford's initial seriation technique (Phillips, Ford and Griffin 1951; Ford 1962) was based upon the division of ceramic collections into exhaustive, exclusive classes or types and then the calculations of type percentages for each unit seriated. This reliance upon type percentages became the hallmark of quantitative seriation (e.g. Robinson 1951; Hole and Shaw 1967; see Marquardt 1978:266-282), except where presence/absence variables were used; in the latter case, however, the variables are almost always at the level of the type and not the attribute (e.g. Cowgill 1972; Ester 1981). Only recently, as the use of factor analysis and multidimensional scaling techniques replace previous

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algorithms written especially for archaeological seriation, have practitioners of quantitative seriation begun to use attributes in place of, or in addition to, types. LeBlanc's realization that attributes provide a finer temporal scale than types (1975) repeats the findings of Rowe (1959) and Lathrap (1962) over twenty years ago. Drennan (1976a,b) advanced beyond LeBlanc in the use of both attributes and types, and Marquardt (1978) formalized this approach with his emphasis on ratio variables which can be calculated at a number of taxonomic levels. This latter flexible approach to the taxonomic level of seriation variables is followed in the present study.

Style versus Function

Style and function in archaeology are usually conceived of as mutually exclusive general properties of artifacts. In a recent formulation of the issue, Sackett notes that style "(a) concerns a highly specific and characteristic manner of doing something, and (b) that this manner is always peculiar to a specific time and place" (Sackett 1977: 370). Function is then portrayed as encompassing all of the observable variability not included under style. As such it includes not only utilitarian factors, but social and ideological components as well (1977: 372). According to Sackett, "style and function together exhaust the potential of this [artifact] variability, save for the fortuitous role post-depositional agencies may play" (1977:370). In this model, any item of material culture possesses both stylistic and functional properties. Following Sackett's definitions, then, stylistic variables should serve as better chronological indicators than do their functional counterparts,

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because, (1) they tend to be "peculiar to a specific time and place" (see above), and (2) stylistic variables, by definition, eliminate most sources of variability other than time or place.

The usefulness of stylistic variables in establishing and monitoring temporal change is generally recognized by archaeologists (see Sackett 1977:374f), even when style and function are defined somewhat differently. For example, Dunnell defines them as follows: "style denotes those forms that do not have detectable selective values. Function is manifest as those forms that directly affect the Darwinian fitness of the populations in which they occur" (Dunnell 1978:199). Although Dunnell's implication that artifacts may be classified unambiguously as either stylistic or functional in nature is untenable, his definitions are generally convergent with those of Sackett, and Dunnell (1977:199f) makes a point of the superiority of stylistic over functional variables in the development of archaeological chronologies. This has been noted several times in the literature on seriation. For example, "good types [for seriation] are likely to have a relatively neutral adaptive value in a culture. Changes in them will derive more from fashion or from random drift than from necessity" (Hole and Shaw 1967:86). Brown (1975:162) similarly notes that "the more a 'functional load' exists on an attribute set, the less successful is the chronology erected from them" (see also Rowe 1959:320-323).

There are two ways of constructing stylistic variables. First, items of material culture contain varying amounts of stylistic and functional information, and thus classes of artifacts exhibiting a high degree of style and little function can be singled out for use as variables. An example of such a stylistic variable would be the proportion of a given

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class of decorated ceramics relative to other classes of decorated ceramics. Second, the stylistic attributes of artifacts may be the focus of variable definitions. For example, the color of slip used on plain bowls would be this kind of stylistic variable. Both of these methods for variable construction are used to define stylistic variables for the present seriation. It should be noted, however, that the style/function distinction is not always clear-cut in practice. Thus variables are included in the seriation which are not necessarily good "stylistic variables" but which were expected to be significant indicators of temporal change (see Wobst 1978 for an alternative approach to the question of style in archaeology).

Distributional Qualities of Seriation Variables

Different archaeological seriation techniques have different requirements for the nature of the temporal distribution of the variables used. Cowgill's "general rules for chronological types" represent the desired distributional qualities of most traditional quantitative seriation techniques: (1) "one will look for types that occur in more than a very few but less than one half of the total set of units to be seriated"; (2) "one will try to avoid redundant types that are nearly always present or absent in the same units"; (3) types are sought which fit Ford's (1962) "battleship curve" temporal distribution; that is, types whose relative frequencies follow a more or less normal distribution through time (Cowgill 1972:386). Cowgill goes on to suggest that type percentages are superior to simple occurrences (presence/absence) where: (1) type frequencies are high; (2) many types occur in some amount in all units; and (3) some mixing of deposits may be a problem (Cowgill 1972:388).

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In discussing seriation based upon ratio scale variables, Marquardt suggests that "variables are chosen in such a way that they either generally increase or generally decrease with the passage of time" (1978:261). This stipulation clearly contradicts Cowgill's rules no. 1 and 3 above for good chronological types, and illustrates how distribution requirements vary with seriation techniques. Marquardt (1978:288-292) advocates seriation using factor analysis, and only variables that generally increase or decrease through time will produce the kind of correlations required for a successful factor analysis. Variables with "battleship curve" distributions will not correlate, and thus will not produce significant temporal factors in Marquardt's technique.

The use of multidimensional scaling for seriation obviates strict requirements for the distributional characteristics of the variables. Variables exhibiting any pattern that involves gradual continuous change (whether generally increasing, decreasing, normal, or multimodal) can produce a successful ordering, so long as they do not change too fast or fluctuate wildly. For this reason, multidimensional scaling has been chosen as the technique for the present seriation. Several factor analyses were also tried, but these produced equivocal results inferior to those obtained with multidimensional scaling.

Seriation of Xochicalco Postclassic Deposits

Deposits Seriated

The twenty deposits selected for seriation are listed in Table 20; the stratigraphy and excavation of these deposits is discussed in Chapter 4 above. In all cases but one (unit 17), the total number of sherds is

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TABLE 20

XOCHICALCO DEPOSITS SERIATED

Collection number	Excavation	Provenience number(s)	Capa	Depth (cm)	Total sherds	Phase[a]
1	B	150	I	0-18	114	4
2	B	155	I/II	0-36	139	4
3	B	170,171,172	I/II	0-38	329	4
4	B	174,175,178,183	I/II	0-36	216	4
5	C	158,159	I	0-27	220	3
6	D1	160	I	0-10	466	3
7	D1	161	IIA	10-20	625	3
8	D1	162	IIB	20-40	1031	2
9	D1	163	III	40-53	344	1
10	D3	164	I	0-20	251	2
11	D3	165	IIA1	20-28	214	1
12	D3	166	IIA2	28-30	107	1
13	D3	168,188	IV	40-60	102	1
14	D2	199,205,206	I	0-20	299	2

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TABLE 20 (continued)

Collection number	Excavation	Provenience number(s)	Capa	Depth (cm)	Total sherds	Phase[a]
15	E	237	IA	0-20	430	3
16	E	238	IB	20-40	334	2
17	E	242	II	40-60	43	-
18	A	109	IA	0-10	435	3
19	A	110	IB	10-20	270	2
20	A	112	II	30-40	238	2

[a]Phases: 1--Tilancingo
2--Temazcalli
3--Cuauhnáhuac, Early facet
4--Cuauhnáhuac, Late facet

over 100. Most excavated levels in El Puerto and Terrace 85 produced a sufficient number of ceramics for quantification, although some (e.g. Capa III of pit D3) yielded well under 100 sherds and were not quantified. An exception was made in the case of unit 17 because of the importance of this level. First, Excavation E contains a nearly continuous sequence from Epiclassic through Late Postclassic without major constructional disturbance. Second, Early Postclassic deposits are generally rare at Xochicalco, and thus levels with these ceramics are relatively more significant than levels with later material. Third, this level contains a rare trade sherd (Fine Orange from the Gulf Coast) whose chronological placement in the Morelos chronology is a topic of some interest. Perhaps not unexpectedly, unit 17 proved to be the most deviant collection in the entire seriation, although it was apparently correctly seriated to the start of the Postclassic sequence (see below). The interpretation of these deposits as secondary refuse, well suited for seriation, is discussed in Chapter 4 above.

Variables Used

The 32 variables utilized in the seriation of Postclassic deposits at Xochicalco are listed in Table 21. Those variables whose definition is not obvious in the table are described further in Table 22; all ceramic classes and attributes are defined and discussed in Chapter 6. The following procedure was followed in selecting these variables. First, variables know to be good time markers or to change in some predictable manner from comparative work elsewhere in Morelos or in central Mexico were selected. For example, Aztec III Black-on-Orange and Texcoco

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TABLE 21

VARIABLES USED IN SERIATION

Variable No.	Name	Description	Mean[a] Count	Class[b]
		A. Ratios of counts to total sherds		
1.	LATEAZ1	Late Aztec imports	1.5	I
2.	GUERO1	Guerrero imports	1.6	I
3.	TOLUCA1	Toluca imports	2.3	I
4.	TEOPAN1	Teopanzolco imports	0.8	I
5.	DECTOT1	Total decorated	27.9	D
6.	DECOLT1	Decorated ollas	4.6	D
7.	GNDA1	Guinda	10.0	D
8.	BASIN1	Basins	3.5	P
		B. Ratios of counts to subtotals		
9.	BTYPES2	B-4 Polychrome/Total decorated	2.7/27.9	D
10.	DBCMPLX2[c]	Complex bowl forms/bowl rims	2.0/10.7	D
11.	PBCMPLX2	Complex bowl forms/bowl rims	1.4/16.6	P
12.	OLPLN2	Unslipped ollas/Total ollas	60.8/185.1	P
13.	OLBLK2	Black slipped ollas/Total ollas	13.2/185.1	P
14.	BLMOTX2	Brown-black bowls/Total bowls	7.1/63.8	P
15.	BLNINT2	Black slipped interiors/Total bowls	5.0/63.8	P
16.	BLPLN2	Unslipped bowls/Total bowls	6.0/63.8	P

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TABLE 21 (continued)

Variable No.	Name	Description	Mean[a] Count	Class[b]
17.	BLSINT2	Interior slip only/Total bowls	5.2/63.8	P
18.	CMPLN2	Unslipped comals/Total comals	5.6/20.4	P
19.	CMBLK2	Black slip comals/Total comals	5.0/20.4	P
		C. Other ratios		
20.	DECOL3	Tlahuica polychrome ollas/Other decorated ollas	0.8/3.8	D
21.	DBLFORM3[c]	Hemispherical bowls/Conical bowls	5.3/1.8	D
22.	PBLFORM3	Hemispherical bowls/Conical bowls	10.0/2.8	P
23.	OLPOL3	Polished/Non-polished ollas	29.0/156.1	P
24.	CMRAT3	Comals/Bowls plus ollas — comals	20.4	P
		bowls	63.8	
25.	BLRAT3	Bowls/Comals plus ollas — ollas	185.1	P
		D. Form and Paste Scales		
26.	OLFORM4	Olla rim flare	8.2	P
27.	CMELEV4	Comal rim elevation	5.4	P
28.	CMANGL4	Comal rim break-angle	3.6	P
29.	PPSTCL4[c]	Paste color	30.3	P
30.	DPSTCL4	Paste color	25.6	D

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TABLE 21 (continued)

Variable No.	Name	Description	Mean[a] Count	Class[b]
31.	PPSTXT4[c]	Paste texture	35.0	P
32.	DPSTXT4	Paste texture	27.9	D

[a]For category A, only the numerators are given. The mean number of Total sherds is 310.1. For categories B and C, both the numerators and denominators are given. For category D, the mean number of sherds per collection upon which the scales are calculated is given.

[b]Variables are here divided into three classes:

I--imported ceramics
P--local undecorated (plain) ceramics
D--local decorated ceramics

[c]Four pairs of variables consist of the same ratios or scales calculated separately for plain and for decorated ceramics; variable names beginning with "P" correspond to plain sherds, while those beginning with "D" pertain to decorated sherds.

TABLE 22

DESCRIPTION OF SELECTED SERIATION VARIABLES

Note: This table describes those variables used in the seriation whose definition is not obvious from Table 21 alone. Full description of the ceramic classes and attributes mentioned here is found in Chapter 6.

1. LATEAZ1: Late Aztec period imports from the Basin of Mexico: Aztec III Black-on-Orange and Texcoco Molded/Texcoco Filleted.

2. GUERO1: Wavy line Red-on-Cream and Taxco Black-on-White.

3. TOLUCA1: All imported types from the Toluca Valley.

4. TEOPAN1: All imported types from the Teopanzolco ceramic complex (see Chapter 6).

5. DECTOT1: All non-imported decorated sherds.

7. GNDA1: Guinda or redware (may include some Basin of Mexico imports, since these are identical to local Guinda).

9. BTYPES2: Local B-types: B-3, B-4 and eroded B sherds.

10. DBCMPLX2: Number of bowl rims with complex forms (bowl forms 310-314, 324-340; see Appendix A). Decorated bowls only.

11. PBCMPLX2: Same as no. 10. Plain bowls only.

14. BLMOTX2: Brown-black or mottled brown bowls.

15. BLNINT2: Bowls with black slipped interiors.

17. BLSINT2: Bowls slipped on the interior only.

21. DBLFORM3: Ratio of hemispherical bowls (forms 315, 316) to conical bowls (forms 317-320). Decorated bowls.

22. PBLFORM3: Same as no. 21. Plain bowls.

26. OLFORM4: Scale of olla rim flaring. Each (plain) olla rim is ranked from 1 (no flaring; e.g. form 110) to 5 (maximum flaring; forms 126-130). The ranks are multiplied by 10 and an average rank calculated for each collection.

27. CMELEV4: Scale of comal rim elevation (see Chapter 4).

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TABLE 22 (continued)

28. CMANGL4: Scale of comal rim break-angles. This is the angle of break between the comal body and the rim. Each comal rim is ranked as follows:

1.	angle less than	5°		(e.g. Form 410)
2.	angle between	5°	and 14°	(e.g. Form 427)
3.	angle between	14°	and 23°	(e.g. Form 412)
4.	angle between	23°	and 32°	(e.g. Form 428)
5.	angle between	32°	and 41°	(e.g. Form 429)
6.	angle greater than	41°		(e.g. Form 413)

29. PPSTCL4: Scale of paste color. This scale only takes into account oxidized sherds (dark unoxidized colors are not included). Buff paste is ranked 1; Orange-Buff is 2; and Orange paste is 3. These are multiplied by 10 and an average rank calculated for each collection. Plain sherds only.

30. DPSTCL4: Same as no. 29. Decorated sherds.

31. PPSTXT4: Scale of paste texture. The 5-rank scale (from 1, very fine paste, to 5, very coarse) is treated similarly to the above scales, with multiplication by 10 and calculation of an average rank for each collection. Plain sherds.

32. DPSTXT4: Same as no. 31. Decorated sherds.

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Molded/Filleted are recognized as good markers of the Late Aztec period in the Basin of Mexico, so they are included as variable no. 1. Similarly, there appears to be a general trend in central Mexico for comal rims to decline in elevation from Early through Late Postclassic times (see Chapter 6). Thus comal rim elevation was measured by two scales: elevation angle (variable no. 27) and break angle (no. 28). Second, variables suspected as good time markers on the basis of preliminary analysis in 1980 were selected; these include variables no. 2, 3, 4, 9, 14, 15, and 20. Third, stylistic attributes that were not too rare and which exhibited a fair degree of variability were added to the seriation (the majority of the variables). Finally, several variables were added which were thought may be time-sensitive, although they appear to be more functional than stylistic in nature (e.g. nos. 24, 25, 29-32).

With a few exceptions, the variables chosen for seriation have average counts of two or more examples per collection (see Table 21); the exceptions are those variables know to be good time markers. Most of the variables are on the level of attributes, although some (nos. 1-9 20, 24 and 25) are constructed using classes of sherds and are thus on the level of types. Variables 1 through 19 are comprised of ratios which may be regarded as percentages. As such, variables of category A represent the percent of the total collection represented by the various classes, while variables 10 to 19 of category B represent the percent of sherds exhibiting various attributes relative to the total number of sherds possessing the dimension along which the attributes are measured. The problem of built-in negative correlations with percentage data (discussed briefly above) does not apply to these variables. The classes employed

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here add up to only 16.6% of the average collection total, while the corresponding figures for the dimensions involved are: ollas (variables 12 and 13), 40%; bowls (14-17), 36.6%; comals (18,19), 52.0%; decorated bowl rims (10), 18.8%; and plain bowl rims (11), 8.4%. Therefore, the cumulative percents of the constituent classes and attributes are low enough to rule out the built-in correlations of closed data which sum to 100%.

All 32 seriation variables are potentially good temporal indicators. However, the possibility exists that some of these change in response more to other factors than to time. Although the 32 taken together produce a good seriation, it was thought that if some of them were not "good seriation variables," then their removal might improve the results. To test this possibility, six separate multidimensional scalings of the collections were carried out on various subsets of the variables. These alternative seriations were based on the following sets of variables:

(A) Eight variables known to be temporally sensitive (nos. 1, 2, 3, 4, 9, 14, 15, 27);

(B) The same eight variables plus eight others which correlated with at least one of them at a level of .5 or higher (Category A plus nos. 5, 12, 16, 18, 25, 28, 30, 31);

(C) Variables describing ceramic decoration (nos. 1, 2, 3, 4, 6, 7, 9, 20);

(D) Vessel form variables (8, 10, 11, 21, 22, 26, 27, 28);

(E) Surface treatment and finish variables (nos. 12-19, 23);

(F) All variables pertaining to undecorated ceramics (all but those in category C).

Based upon stratigraphic inversions and measures of the "fit" of the units

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to the seriation time-curve (see below), the original 32-variable scaling was superior to all six of these alternative runs. This suggests that at least most of the 32 variables are time-sensitive, and the use of a relatively large number of variables did not introduce much non-temporal noise into the seriation. Other combinations of variables were not tested due to constraints of computer time.

Multidimensional Scaling and Seriation

Multidimensional scaling consists of a set of numerical techniques developed in the social and behavioral sciences for the recovery of "hidden structure" in sets of quantitative data. The first step in scaling is the calculation of some measure of similarity (or dissimilarity) between all possible pairs of objects or units under analysis (in the present study, the objects are ceramic collections and the similarities are calculated on the basis of each collection's scores on the 32 seriation variables). If there are n different objects, the similarity values among the pairs of objects may be arranged in an n by n "similarity matrix." Such a matrix forms the input into most multidimensional scaling programs. If the similarities among objects are expressed geometrically such that the distance between two objects is inversely proportional to their measure of similarity, then the spacial relationships among all n objects may be plotted in a geometric space of (n-1) dimensions. For data sets with more than four objects, such multidimensional structures cannot be visualized, and exist only in mathematical form.

The task of multidimensional scaling is to reduce the number of dimensions required to represent relationships among the objects, while

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preserving their relative distances as much as possible. A one-, two- or even three-dimensional "reduced rank" configuration is easily visualized, and often preserves enough of the structure of the data to form the basis for interpretation. Multidimensional scaling programs produce configurations at whatever number of dimensions is specified, and calculate measures of deviation or distortion from the original similarity or proximity matrix. The fewer the dimensions used, the greater the distortion (usually measured with a statistic known as "Stress"); however, as the number of dimensions decreases, the ease of interpretation increases. The choice of dimensions in most cases thus represents a trade-off between distortion and interpretability.

Traditional quantitative seriation techniques may be regarded as a kind of multidimensional scaling where the final configuration is limited to a single dimension. Because unidimensional scalings of complex data almost always have a high Stress value, much of the work on quantitative seriation is devoted to finding the best of a number of not-very-good solutions (e.g. Hole and Shaw 1967). The use of multidimensional scaling, where a seriation can be sought in two or even three dimensions, proves much more flexible and effective than the traditional quantitative seriation techniques. This was suggested by Cowgill some time ago:

> I do think, however, that relatively sophisticated studies of seriation, such as Hole and Shaw (1967) . . . may be carrying seriation about as far as is profitable, and that a multidimensional proximity analysis approach will be far more useful than further refinements of one-dimensional seriation (Cowgill 1968a:374).

The first major discussion of the applicability of multidimensional scaling to seriation was that of Kruskal (1971), whose article is titled, "Multi-dimensional scaling in archaeology: Time is not the only dimension."

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Kruskal's rationale for the use of multidimensional scaling for seriation is that the similarity data in any given instance may reflect dimensions in addition to time. In such a case, a unidimensional configuration might not adequately model the temporal dimension desired. When a multidimensional configuration is obtained for the same similarity or proximity matrix, Kruskal suggests that time may emerge as one dimension, while the other dimension(s) reflect some combination of nontemporal factors. Kruskal, who is a statistician and not an archaeologist, implies that in such a situation, the other dimension(s) will be interpretable as status, function, or whatever, just as the one dimension is interpreted as representing time (p. 131). This view is in keeping with most applications of multidimensional scaling in the social sciences, where several interpretable dimensions are usually sought in the final configuration (see Kruskal and Wish 1978:30-48, 60-70). However, time as a dimension is of a quite different order than factors like status and function (see Spaulding 1960). These latter variables are only interpretable in a given cultural setting; that is, in reference to other aspects of a given culture at a given time. Such factors do not have any meaning independent of the temporal dimension. To state this another way, it is impossible to directly compare status A with status B if one is ignorant of the temporal variable connecting the two. This point is also made by Lathrap, who argues that:

> . . . questions of cultural significance can not be asked in general. . . . The culturally meaningful discontinuities of artifact variation [e.g. those due to status, function, etc.] must be sought in assemblages [i.e. groups of artifacts with <u>limited</u> temporal and spatial variations] and not in artifact collections [i.e. groups of artifacts with <u>significant</u> temporal and/or spatial variation] (Lathrap 1962:222).

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Therefore, if one axis of a multidimensional configuration is interpreted as a temporal dimension, then it is not valid to look for meaningful interpretations of the other axes.

This situation in fact has rarely arisen in multidimensional scaling approaches to archaeological seriation. In those cases where one linear dimension or axis of a two- or three-dimensional arrangement has been found which corresponds to time (e.g. Cowgill 1972:408,419), no attempt is made to interpret the other axes. However, a more common occurrence when a unidimensional structure (e.g. a successfully seriated sequence of collections) is represented in a scaling configuration of two dimensions, is for the sequence to assume a curved shape, referred to as the "horseshoe phenomenon" (e.g. Kendall 1971:227). In this situation, a one-dimensional arrangement takes the form of a curve, which requires two dimensions for its representation. This situation has been observed not only in archaeological seriation (e.g. Kendall 1971; Drennan 1976a, 1976b; Marquardt 1978:291), but in psychological (Carroll and Arabie 1980:617; Shepard 1974:385ff) and other studies (Kruskal and Wish 1978:88f) as well.

Kruskal and Wish (1978:89) state that "the horseshoe phenomenon, which has been observed on quite a few occasions, is not entirely understood," although Kendall (1971:227) asserts that the configuration "is to be expected on general Lie-group theoretical grounds." The most likely explanation is given by Shepard, who discusses several (non-archaeological) examples of horseshoe sequences:

> Evidently, by bending away from a one-dimensional straight line, the configuration is able to take advantage of the extra degrees of freedom provided by additional dimensions to achieve a better fit to the random fluctuations in the similarity data (Shepard 1974:386).

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Although he does not make this inference, it might be suggested on the basis of Shepard's observation that the more random fluctuations there are in the data (i.e. the greater the level of "noise"), the more likely is a unidimensional structure to bend into a curve. Thus given the relatively "noisy" nature of archaeological data, it is not surprising that the horseshoe phenomenon is commonly found in chronological seriation.

Based upon the findings discussed above, a successful archaeological seriation, when carried out by multidimensional scaling and plotted in two dimensions, can be expected to conform to one of two configurations. First, the units may seriate along a straight line (e.g. Cowgill 1972:408, 419), in which time emerges simply as one of the axes of the solution. Second, the units may seriate along a curve, or "horseshoe," in which case the curve itself may be interpreted as the temporal dimension. One advantage of using two dimensions in the search for a unidimensional sequence is that it is possible for the seriation to <u>fail</u> (Kendall 1971:223; Cowgill 1972:397). If there is no good unidimensional arrangement of the objects, the two-dimensional plot will reveal this as a lack of conformation to one of the two predicted configurations. This property is in contrast to unidimensional techniques like traditional quantitative seriation, where it is possible to find some sort of seriated sequence in just about any data set. Also, the use of two dimensions instead of one renders less likely the possibility that the final configuration represents a sub-optimal scaling of the data (i.e. achievement of a local rather than the global minimum), a problem inherent in the iterative algorithms of multidimensional scaling programs (see Kendall 1971:223; Kruskal and Wish 1978:27f).

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Because the desired structure of a seriation--a unidimensional arramgement, whether expressed in one or two dimensions--is known a priori, one of the major interpretive problems of multidimensional scaling is avoided. This concerns the search for the appropriate number of dimensions needed to represent the structure inherent in the data set. Much has been written on this subject, and most authors urge scaling a given similarity matrix five times, for one through five dimensions. Of the five configurations, the best one is chosen based upon some subjective combination of: (1) goodness of fit, usually measured by the Stress statistic; (2) interpretability; (3) ease of use; (4) stability and "generalizability" (see Kruskal and Wish 1978:48-60 for discussion of these issues). However, seriation involves not searching blindly for structure but rather testing for the existence of a certain highly specific structure. Since two dimensions are sufficient to determine whether or not that structure does or does not exist (see above), then the elaborate procedures recommended for determining dimensionality are not of direct use in most seriations. Nevertheless, Drennan (1976b:48-52) spends a number of paragraphs discussing various methods of choosing the appropriate number of dimensions for his seriation; it is not surprising, however, that he ends up with two.

Before presenting the actual seriation, some words should be said about the issue of metric versus nonmetric multidimensional scaling. "Metric" multidimensional scaling was the first type developed. The technique is based on the assumption that the measured dissimilarities of the input data are directly proportional to the actual underlying distances between the objects (plus some error factor). "Nonmetric" multidimensional scaling, a more recent development, relaxes this assumption of

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proportionality and utilizes only the rank order of the dissimilarity values. Thus ordinal data may be scaled by the newer technique (see Kruskal and Wish 1978:22; Kruskal 1971:123f), making it especially useful in social science applications (see Shepard 1972:6).

Although the proximity data upon which archaeological seriations are based do not necessarily represent an ordinal scale, Drennan (1976b: 47f) advocates the use of nonmetric multidimensional scaling in archaeological applications. He bases this upon an objection to the assumption, required in metric scaling of ceramic collections, that "the coefficient of ceramic dissimilarity which is chosen is directly proportional to the metric of the structure underlying this dissimilarity" (Drennan 1976b:47). Although Drennan calls this assumption "insidious," his only stated reason for rejecting it is that "such methods [metric scaling] may (and often do) produce different final orderings than produced by nonmetric scaling" (1976b: 48). However, I see nothing wrong with the stricter assumption of metric multidimensional scaling other than the fact that archaeological data usually have a large component of random error; this does not necessarily mean that the similarities between ceramic collections must be considered as ordinal rather than ratio or interval scales. Kruskal and Wish (1978: 76-78) explicitly evaluate the relative merits of the two methods as follows. Compared to traditional metric scaling, the nonmetric method has two advantages: (1) it is easier to choose the appropriate dimensionality; and (2) the Stress values are usually lower. Given the relative unimportance of the dimensionality issue in seriation work (see above), the first advantage is not significant. The lower Stress values in nonmetric scaling are an artifact of the algorithm used, and thus do not appear

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to represent any absolute superiority of the nonmetric over the metric model.

On the other hand, Kruskal and Wish (1978:76-78) point out two disadvantages of the former relative to the latter: (1) nonmetric methods are far more likely to produce "degenerate" solutions; and (2) they are less resistant to local minima representing sub-optimal configurations. A "degenerate" solution is a configuration where the points (objects) are strongly clumped, clustering on a very few locations (Kruskal and Wish 1978:29f). It is clear that such a situation would be inappropriate for most archaeological seriations. The problem of the solution getting trapped in a local, rather than the global, minimum was mentioned above. This means that a configuration has been found which, while better than at least one alternative, is not the best solution available for the data. This problem is built into the methods utilized by virtually all multidimensional scaling programs, and is a very real difficulty (Kruskal and Wish 1978:27f). Two dimensional solutions are more resistant to local minima than are unidimensional solutions, and metric scaling is more resistant to them than is nonmetric scaling. Based upon these findings, the present seriation uses the standard metric multidimensional scaling model. However, more work is needed in the empirical comparison of the two models for their particular strengths and weaknesses in scaling archaeological data for the purpose of seriation. Further discussion of multidimensional scaling in general may be found in Kruskal (1971), Shepard (1972, 1974), Kruskal and Wish (1978), and Carroll and Arabie (1980).

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Seriation of the Xochicalco Data

Initial quantitative processing of ceramic data from Xochicalco was done with programs written by the author in the FORTRAN language. Subsequently, data were read into the SPSS statistical package (Nie et al. 1975) for further analysis. Basic descriptive statistics were calculated as a first step in choosing the seriation variables. Once the 32 variables had been decided upon, their values for the 20 provenience units were standardized by transformation to Z-scores using the CONDESCRIPTIVE program of SPSS (Nie et al. 1975:187). Z-scores, obtained by subtracting the variable mean from each value and then dividing by the standard deviation, have the properties of a mean of zero and a standard deviation of one. Such standardization assures that the variables of greatest magnitude (e.g. OLFORM4, with a mean of 33.1) will not swamp the rarer categories (e.g. LATEAZ1, mean of .005); all 32 variables thus contribute equally to calculation of the similarity coefficients between collections.

The similarity coefficients (actually dissimilarity coefficients) were calculated according to the simple Euclidean distance formula using a FORTRAN program written by Barry Friedman. The formula for the distance or dissimilarity between any two collections (i and j) is:

$$d_{i,j} = \sqrt{\sum_{r=1}^{k} (X_{i,r} - X_{j,r})^2}$$

where i and j represent the two units whose distance is being calculated; k is the number of variables (32 here); and r runs from 1 to 32. Thus for each pair of collections (i and j), the square of the difference between their scores is calculated for each of the 32 variables. These squared differences are summed up and the square root taken. This

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Euclidean distance measure was chosen over the many alternative similarity coefficients available because of its simplicity and generality (see Cronbach and Gleser 1953:459 or Kruskal and Wish 1978:17f); Marquardt (1978:266-287) reviews the various coefficients that have been used by archaeologists for seriation.

The 20 by 20 distance matrix was then fed into the ALSCAL-4 multidimensional scaling program (Young and Lewyckyj 1979) to execute the actual seriation. This program is one of the most flexible available, capable of performing metric multidimensional scaling, non-metric scaling, multidimensional unfolding, scaling based upon individual differences models, and other advanced scaling techniques (see Kruskal and Wish 1978 or Carroll and Arabie 1980 for discussion of these alternative scaling models). For the purpose of seriation, however, the simplest scaling model (known as two-way, one-mode analysis) is used. As mentioned earlier, the metric rather than nonmetric model is utilized in the present study. This is done in ALSCAL-4 by specifying the measurement level of the input data as ratio level; specifying ordinal level data produces a nonmetric scaling. The initial scaling run produced both a two-dimensional and a one-dimensional solution. The latter contained a number of major stratigraphic inversions between collections and was therefore disregarded. The two dimensional configuration yielded a scatter of points through which a time-curve was easily fitted, resulting in a quite reasonable seriated order of the collections (see Figure 16).

Before interpreting the configuration as an actual chronological seriation, two points about the scaling results should be mentioned. First, the configuration shown in Figure 16 has been rotated approximately

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Figure 16. Two-dimensional scaling plot of Xochicalco collections with inferred seriation time-curve. See Table 20 for a key to the numbered provenience units.

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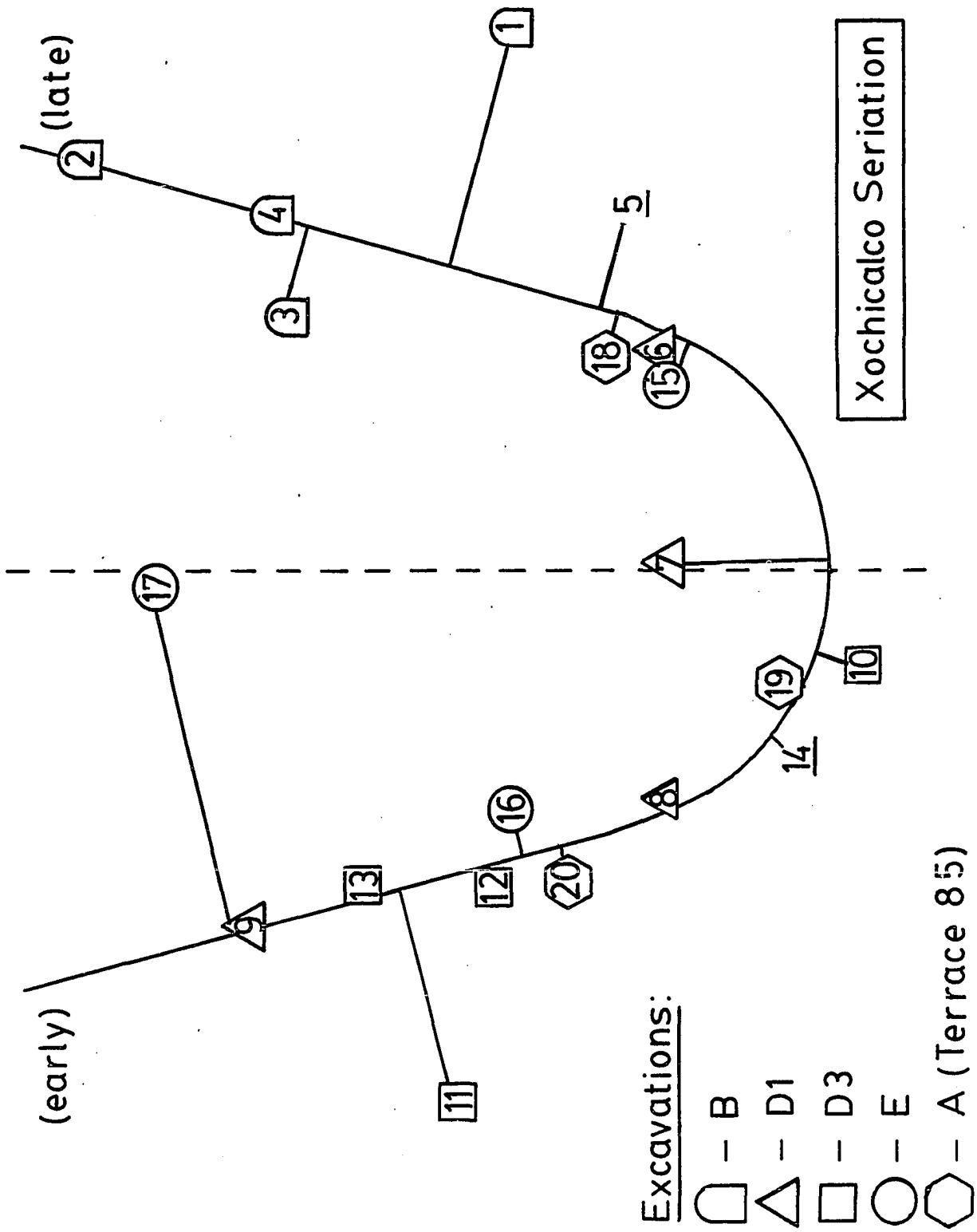

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14 degrees from that printed out by the ALSCAL-4 program. This is justifiable, because,

> The solutions to ordinary multidimensional scaling . . . are always subject to rotation. Since the configuration may be freely rotated, the coordinate axes have no special significance, and are no more meaningful than lines in any other direction (Kruskal and Wish 1978:35).

In this respect, multidimensional scaling is quite different from factor analysis, where the axes produced by the program do have special significance. As Kruskal and Wish note, some rotations "may be more pleasing aesthetically," (p. 35) and for this reason, the configuration was rotated once the time-curve had been drawn.

Second, the Stress value of the two-dimensional solution is relatively high (Kruskal's Stress = .287). While there is no absolute standard against which Stress values may be compared, this value is higher than that obtained in most multidimensional scaling solutions (see Kruskal and Wish 1978:49-56). For comparative purposes, the data were scaled in three dimensions in order to compare Stress values. Stress for the one-, two-, and three-dimensional configurations are presented in Table 23, where it may be seen that the improvement in Stress (expressed as % change) is less going from two to three dimensions than going from one to two dimensions. Another measure of the "goodness-of-fit" of a multidimensional scaling is provided by ALSCAL-4. This statistic, r-squared, "can be interpreted as indicating the proportion of variance of the disparities (the optimally scaled data) which is accounted for by the multidimensional scaling model" (Young and Lewyckyj 1979:28-29). In other words, r-squared measures the degree to which the similarity values of the input data are maintained in the scaled configuration. The more

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TABLE 23

"GOODNESS-OF-FIT" MEASURES FOR THREE SCALING SOLUTIONS

No. of dimensions	Stress		r^2	
	Value	% change	Value	% Change
1	.488	-	.433	-
2	.287	41.2	.686	58.4
3	.202	29.6	.765	11.5

the solution departs from the original data, the lower the r-squared value, and the higher the Stress. It can be seen in Table 23 that the one- to two-dimension improvement in this statistic is dramatic, while adding a third dimension only results in moderate improvement. Young and Lewyckyj (1978:29) recommend utilization of the r-squared statistic in evaluation of degree of fit in place of the more common Stress statistic, because of its "straightforward interpretation."

This brief investigation of Stress and r-squared values for one-, two- and three-dimensional solutions was undertaken because of the relatively high Stress associated with the two-dimensional configuration. The lack of dramatic decrease in Stress in going from two to three dimensions would point to two dimensions as the appropriate number, following the most common rule-of-thumb used to determine dimensionality (e.g. Kruskal 1971:128f). Although the use of two dimensions had been decided upon a priori because of the nature of the seriation problem, this exercise provides further support for that decision. It may be that the Stress value would be lower for a nonmetric scaling of the data, but this was not attempted. In spite of the high Stress, however, the configuration does yield a good seriation, as evaluated both on criteria internal to the scaling procedure and on archaeological criteria external to the multidimensional scaling results. These, and not Stress or r-squared, are the real bases for evaluation of the success of the seriation.

The time curve shown in Figure 16 was produced by first drawing lines connecting the points representing successive strata in each of the four stratigraphic columns (Table 20). These individual stratigraphic time-lines, which overlapped considerably, were then consolidated into a

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single curve which was intermediate among the four lines in placement and which passed through or as close to as many points as possible. The resulting curve ran from unit 9 to unit 18, and by extending the curve symmetrically beyond unit 18, it passed through units 2 and 4. Thus the time-curve was produced by "eyeballing" a curve through the points using stratigraphy as a constraint. Points not falling on the curve are connected to it by lines perpendicular to it at the closest point, and the temporal ordering determined by simply moving along the line from upper left to upper right, in line with the stratigraphic ordering of the four pits. Drennan (1976a:296; 1976b:51-54) arrived at his seriation time-curve through an elaborate procedure utilizing successive multiple regressions and other techniques; he later suggested, however, that a simple visual fitting of the curve would yield equivalent results (personal communication, 1981).

Even though the time curve was produced using stratigraphy as a constraint, it is significant that only one minor stratigraphic reversal occurred: the two metric subdivisions of Capa IIA in pit D3 (units 11 and 12) are reversed in the seriation. This compares with alternative scalings run on the six subsets of the 32 variables, where major reversals of Capas occurred, in whatever manner the time curve was drawn. This "external" evaluation of the time curve (external to the data and methods used in scaling the collections) is matched by a form of "internal" check often used to evaluate multidimensional scaling configurations. As one way of evaluating the degree to which the closeness of the scaled points actually model the similarities among objects of the input data (i.e. an alternative way of testing the degree of fit of the solution to the original

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similarities), Kruskal and Wish (1978:46-48) advocate drawing lines on the scaled plot between pairs of objects with the highest similarity measures in the original matrix. In general, there should be more lines connecting nearby points than between more distant points, but more importantly, there should be few or no "long and haphazardly crossing lines" (Kruskal and Wish 1978:46). The arrangement of these connecting lines can reveal significant information on the structure of the data set, and this is the case in the present analysis (see Figure 17). Because input data consist of dissimilarity values, lines are drawn between units with the lowest dissimilarity. The values of the input data range from 4.3 (most similar) to 12.1 (most dissimilar). Following the recommendations of Kruskal and Wish (1978:46), two levels of similarity are illustrated: a heavy line represents dissimilarities below 5.0, while a lighter line represents those between 5.0 and 6.5. These intervals were chosen to balance interpretability (too many lines produces a cluttered confusing figure) and information content (too few lines results in the loss of information). The resulting structure shown in Figure 17 is curvilinear in form and virtually duplicates the time curve of Figure 16. If the time curve had originally been drawn based solely upon this internal structure, the only difference would be that it would pass closer to unit 7. Projecting the other units onto this hypothetical alternative curve would not change any of the relative orders, however. This exercise therefore provides internal confirmation of the validity of the time curve, just as stratigraphy provides external support.

Several features of the seriation time curve should be discussed. First, there are a few deviant collections whose scores on the seriation

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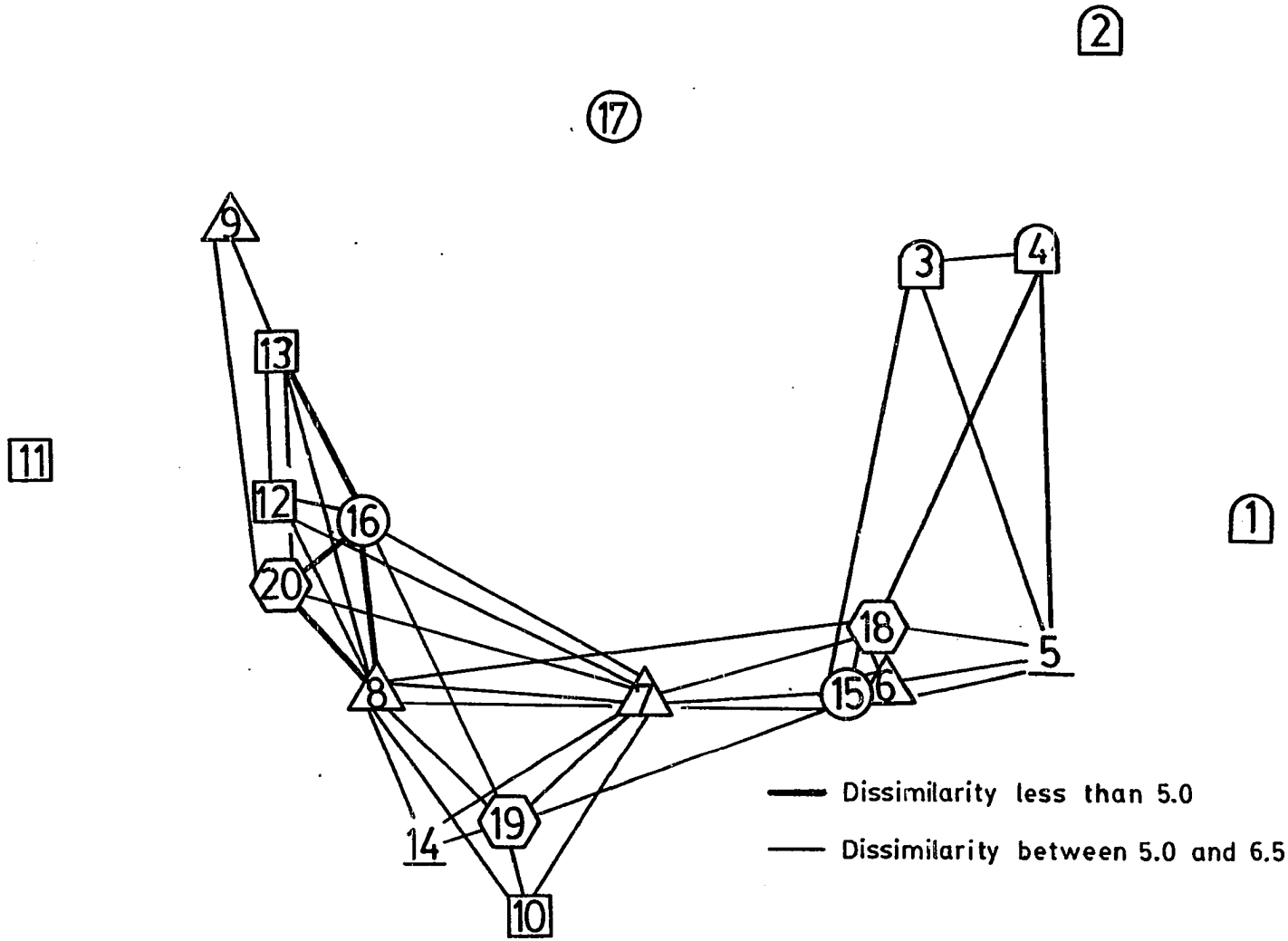

Figure 17. Two-dimensional scaling plot with lines connecting pairs of points (collections) with the lowest dissimilarity values (scores range from 4.3 to 12.1).

variables are not highly similar to those of any other collection. Four of these stand out in Figure 17; their lowest dissimilarity values are as follows: Unit 1, 7.7 with unit 18; Unit 2, 7.3 with unit 3; Unit 11, 6.9 with unit 13; and Unit 17, 7.2 with unit 7. Although these values are not inordinately high (the maximum value in the matrix is 12.1), they do make these units stand somewhat apart from the rest of the collections. The single most deviant collection is unit 17, which not surprisingly is the one collection with fewer than 100 sherds included in the quantitative analysis (it has only 43 sherds). Nevertheless, it does fall at the start of the sequence, in line with its stratigraphic position between Epiclassic deposits and later Postclassic levels. The second observation to make on Figures 16 and 17 is that the seriated sequence is strongest between units 13 and 5, and the weakest at the latest end in the upper right. The four collections at this late end of the scale comprise the four divisions of Excavation B (units 1 to 4), which were expected to seriate very close together due to their adjacency. This problem is considered below in the discussion of defining ceramic periods from the sequence.

Periodification

If the ceramic collections seriated here contained twenty to thirty times as many sherds as they do, then it might be possible to study patterns of continuous change through the Postclassic epoch without dividing the sequence into discrete periods. In such an "ideal" situation, the sizes of the collections would probably represent samples large enough so that: (1) their seriation would be highly precise, or very fine in scale; and (2) each individual collection could be compared reliably with the others.

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Changes in nonceramic artifacts from the seriated deposits could also be traced through time with great accuracy, and a relatively fine-grained picture of change through the Postclassic epoch would result (the kinds of recommendations that Plog 1973:188ff makes on studying change are based upon this kind of hypothetical ideal situation).

Unfortunately, the collections seriated here average 300 and not 5,000 sherds apiece. These low collection sizes (low compared to the ideal, but not in relation to standard archaeological practice) make necessary the division of the seriated sequence into periods, for two reasons. First, most collection sizes are too small to represent an adequate sample of the ceramics in use at any given time. By summing the total of collections that seriate close together, the sample becomes more adequate, although the time span represented increases and chronological detail is presumably lost. This is the usual rationale for dividing ceramic sequences into phases, although it is often expressed in terms of needing periods or phases for purposes of comparison rather than in terms of increasing the sample size (e.g. Drennan 1976b:54).

There is a second, indirect, reason that small collection sizes require periodification of a seriated sequence. If a sequence is generally accurate, yet imprecise, then periodification is called for, and there is reason to believe that the precision of a seriation is directly affected by the size of the collections seriated. The "precision" of a seriation may be defined as the degree to which small intervals of time are correctly measured by the position of the units along the seriated sequence. This concept may be distinguished from the "accuracy" of a seriation, which refers to the extent to which the overall sequence corresponds to a

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temporal ordering. In the present seriation, the preservation of stratigraphic order in the four major excavations is a sign that the sequence is accurate in its general configuration. However, accuracy does not imply precision, which cannot be measured by the stratigraphic data from separate pits. For example, units 15, 6, and 18, representing the top levels in three different excavations, seriate closely together in that order. In a precise seriation, we could be confident that this is the correct temporal ordering of these three units. However, the correctness of this order, or even its superiority over alternative arrangements of these units, cannot be ascertained in the present case. Thus, a certain degree of imprecision must be attributed to the seriation in spite of its overall accuracy. If there is reason to believe that a seriated sequence is not very precise, and this is usually the case, then judicious division of the sequence into phases can eliminate uncertainties concerning the relative positions of nearby units. By including collections 15, 6, and 18 in a single phase, their relative order ceases to be a problem.

The precision of a seriation is in large part determined by the size of the collections seriated. Larger collections may be expected to yield more precise orderings, because they are more likely to comprise representative samples of past material culture. For this reason, the values of time-sensitive variables will generally be more representative or accurate in large artifact collections. While the best way to demonstrate the postulated relationship between sample size and precision would be to compare seriations of the same or similar data sets, controlling for other factors (perhaps through simulation), the present study lends support to this conclusion on the basis of comparisons between individual collections.

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In this seriation, the external criterion of success or accuracy, stratigraphy, is not sufficiently fine-grained to measure the precision of the placement and relative order of units along the sequence. Therefore, internal criteria based upon the similarity data are used to investigate the precision of the seriation. While this discussion has dealt with the precision of the seriated sequence as a whole, the concept also applies to smaller segments of a sequence, as well as to individual units themselves. If the seriation variables are sufficiently time-sensitive, then the most precise segments of a seriation will be those with the greatest number of high similarities along the time-curve. In Figure 17, the similarities or connections among units are greatest between units 13 and 18, and this middle portion, therefore, may be regarded as more precise than the two end segments of the sequence. Extending this notion to individual collections, those with the greatest number of connections, such as unit 7, are probably more precisely ordered than those with fewer connections.

Following the line of reasoning, the "connectivity" of individual collections is quantified and compared with the number of sherds per collection in Table 24. Two measures of connectivity are portrayed: (1) the sum of the dissimilarity values between each unit and all other units; and (2) the number of dissimilarities under 6.5, which represents the number of connecting lines illustrated in Figure 17. The dissimilarities sum, which provides an inverse measure of connectivity, is negatively correlated with the number of sherds ($r = -.587$), and the number of high dissimilarity values is positively correlated with the number of sherds ($r = +.747$). Thus, if the connectivity of a unit is indeed a measure of

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TABLE 24

"CONNECTIVITY" AND SAMPLE SIZE OF SERIATED DEPOSITS

Collection number	Sum of dissimilarities	No. of dissimilarities under 6.5[a]	No. of sherds
2	190.7	0	139
4	157.1	3	216
3	144.1	3	329
1	178.9	0	114
5	151.0	5	220
18	139.2	6	435
6	136.1	5	466
15	134.8	5	430
7	123.2	10	625
10	155.7	3	251
19	140.4	5	270
14	149.7	3	299
8	127.7	10	1031
20	138.6	5	238
16	127.1	6	334
12	138.7	4	107
11	171.3	0	214
13	144.4	6	102
9	167.3	2	344
17	163.4	0	43

Correlation between sum of dissimilarities and number of sherds: -.587. Correlation between number of dissimilarities under 6.5 and number of sherds: +.747.

[a]See Figure 17.

the precision of a unit's placement along the time-curve, then precision is directly affected by the sample size of the collections.

When a high degree of precision cannot be established for a generally accurate seriation, periodification of the sequence is called for. Because periodification involves a sacrifice of temporal detail, it should be done carefully in order to preserve as much chronological information as possible. In the absence of a precise sequence, all units included within a phase must be treated as contemporaneous. For this reason, phases should be as homogeneous and mutually distinctive as possible (in statistical terms, within-group variance should be minimized and between-group variance maximized). In a phased sequence, change will appear to proceed in a step-like manner, with periods of stability or stasis (phases) alternating with brief episodes of rapid change (phase divisions). This view of change is a product only of the nature of archaeological data and techniques and is not necessarily the way in which change actually proceeded in the past. Unless our chronological tools are very precise, a step-wise model of change is the closest approximation possible to the prehistoric past. Plog's (1973:189-191) arguments for studying continuous change are attractive in theory, but the precision necessary to implement such continuous models is rarely present in archaeological techniques. I therefore disagree with Drennan's contention that "the usual basis for the division of a ceramic sequence into phases is the assumption, almost always implicit, that ceramic change proceeds through periods of relative stability alternating with short periods of rapid change" (Drennan 1976b:54). While it is true that some archaeologists do argue for such a step-wise model of artifact change (e.g. Spaulding 1960:453f), others argue explicitly against such a

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model (e.g. Ford 1962; Lathrap 1962:243f discusses this aspect of disagreement between Spaulding and Ford). Nevertheless, archaeologists define periods in order to approach prehistoric change as precisely as possible given the available data and techniques. Small sample size and lack of precision, rather than assumptions about ceramic change, form the basis for periodification in most cases (Cowgill 1968b:519 also discusses briefly the negative effects of small sample size upon the overall success of seriations).

While the mean sample size of the Xochicalco collections (310.1 sherds) is relatively large by archaeological standards[1], it is probably not large enough to yield a very precise seriation. Given the hypothesized relationship between connectivity and precision, parts of the Xochicalco sequence are more precise than others. For these reasons, division of the time-curve into phases is clearly called for. Three kinds of data were used to divide the Xochicalco Postclassic sequence into periods: (1) presence of decorated ceramics, both local and imported, known to be good temporal markers; (2) other ceramic quantities and ratios thought to be temporal indicators; (3) internal characteristics of the similarity data and the seriated time-curve. It was not deemed necessary to limit the ceramic categories used in periodification to those 32 variables used in the seriation, as Drennan (1976b) does. In the first two categories of data, ten ceramic classes were especially important. These classes, whose counts are shown in Table 25, are the following.

A. Western imports

(1) Guerrero imports: Seriation variable 2.

(2) Toluca imports: Seriation variable 3.

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TABLE 25

SERIATED ORDER OF DEPOSITS: STRATIGRAPHY AND PERIODIFICATION

Coll. No.	Stratigraphy: Exc. D1	Exc. D3	Exc. E	Exc. A	Counts: Total sherds	Total dec.	Western imports: 1*	2	3	"Tlahuica" ceramics: 4	5	6	7	Late Aztec imports: 8	9	10	Phase
2					139	8		1		1	-	-	5			4	Late Cuauhnahuac Phase
4					216	9				1	-	1	18			2	
3					329	21				2	2	-	21			2	
1					114	15				6	-	-	7			3	
5					220	15			1	8	-	-	8	-	1	-	Early Cuauhnahuac Phase
18				IA	435	33			-	4	-	-	6	11	1	-	
6	I				466	15			3	11	1	2	13	-	2	-	
15			IA		430	36			-	8	-	4	22	1	-	-	
7	IIA				625	58			1	5	2	8	17	-	1	6	
10		I			251	42	-	2		6	5	4	9				Temazcalli Phase
19				IB	270	36	-	-		2	-	1	6				
14					299	41	1	3		1	-	5	-				
8	IIB				1031	117	9	17		3	4	5	-				
20				II	238	25	2	2		-	-	2	-				
16			IB		334	34	3	1		3	1	-	4				
12		IIA2			107	12	1	2									Tilancingo Phase
11		IIA1			214	23	5	4									
13		IV			102	8	2	1									
9	III				344	39	7	14									
17			II		43	5											Phase H

* See text for discussion of the ten decorated ceramic classes listed here.

(3) Malinalco imports: Malinalco Polychrome (see Chapter 6).

B. "Tlahuica" ceramics

(4) B-4 Polychrome Bowls: Seriation variable 9.

(5) Tlahuica polychrome ollas: See seriation variable 20.

(6) Teopanzolco imports: Seriation variable 4.

(7) Brown-black bowls: Seriation variable 14.

C. Late Aztec Imports

(8) Aztec III Black-on-Orange: See seriation variable 1.

(9) Comal form 414: Although probably not an actual import from the Basin of Mexico, this comal form is very similar to a Late Aztec form in the Basin of Mexico (see Chapter 6).

(10) Texcoco Molded/Filleted: See seriation variable 1.

The horizontal lines in Table 25 were drawn so as to maximize discontinuities between periods. As such the Tilancingo/Temazcalli division marks the start of the distinctive Tlahuica polychrome ceramics in western Morelos and a decline in the percent of Guerrero imports (only the counts are shown in Table 25). The Temazcalli/Cuauhnáhuac division marks the end of the Guerrero imports, the start of the Malinalco and Late Aztec imports, and an increase in the percent of B-4 polychromes. The Cuauhnáhuac phase was divided into an Early and Late Facet on the basis of the end of Malinalco, Aztec III, and Teopanzolco imports. There are many other distinctions among the ceramics of these four periods (see Chapter 6), but only the more dramatic and clear-cut cases presented here. This four-period sequence was then mapped on to the time-curve (Figure 18).

The hypothesized lack of precision of the seriation suggests that evaluation of fit between the period divisions and the time-curve should

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Figure 18. Seriation time-curve with period divisions marked. Ovals indicate clusters of similar collections.

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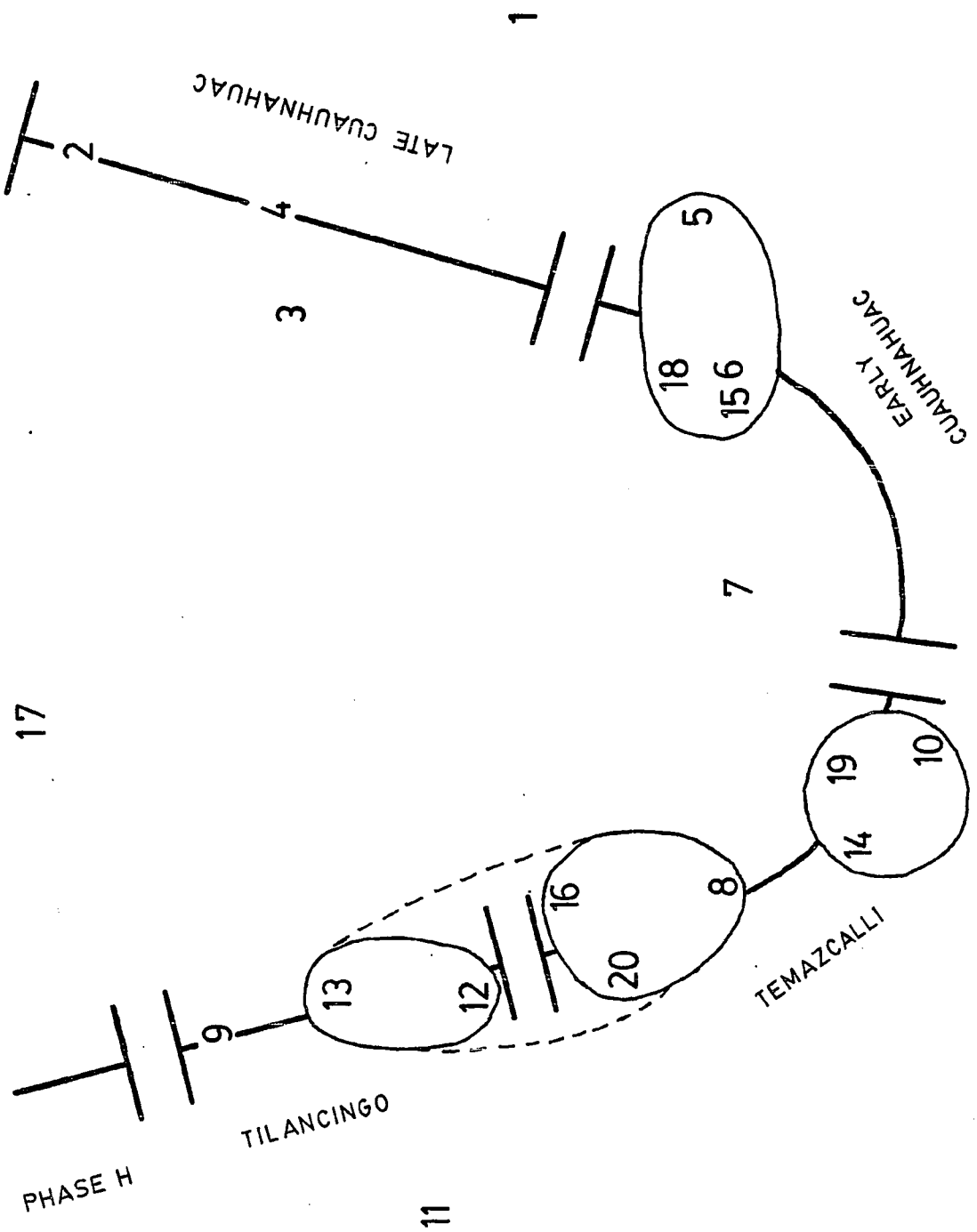

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not be carried out at too fine a scale. Accordingly, three "clusters" of collections were identified on the basis of proximity in the configuration of Figure 16 and connectivity, shown by the lines in Figure 17. Two of these clusters (units 15, 6, 18, and 5; and units 14, 19, and 10) fell within phases, while the third cluster (units 13, 12, 16, 20, and 8) was split into subclusters by the Tilancingo phase/Temazcalli division (see Figure 18). Thus, similarity values among collections were higher across this division than across the others. Nevertheless, the other clusters remain intact, and the scaling configuration and similarity values support the proposed periodification of the sequence in general terms. This issue will be taken up again below, where ceramic distinctions among the periods are investigated through discriminant analysis.

The weakest portion of the chronological sequence is clearly the Late Facet of the Cuauhnáhuac phase. There are three aspects to this problem: first, the four collections are relatively dispersed in the scaling (i.e. they are not very similar), in spite of their common origin as adjacent excavation units in Excavation B. Second, they are only indirectly related stratigraphically to the other collections, and therefore their position in the seriation is based primarily upon internal rather than external factors. Third, the Early/Late Cuauhnáhuac phase division is not as strongly indicated in Table 25 or in other ceramic classes as are the other major phase divisions. These factors suggest that differences between the Excavation B collections and the Early Cuauhnáhuac collections may be attributable to non-temporal factors. Perhaps the El Puerto plaza contained different kinds of refuse than the secondary deposits from the other excavations. In other words, these collections may be contemporaneous

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with the Early Cuauhnáhuac collections, but different due to their specialized nature. In order to investigate this possibility, the seriation was evaluated by two methods: (1) discriminant analysis of the proposed phases; and (2) extension of the sequence to the nearby site of Coatetelco for comparison.

Discriminant Analysis of Postclassic Phases

Discriminant analysis is a multivariate statistical technique which investigates the degree to which differences between groups of cases can be accounted for by combinations of variables (in the present analysis, the cases are the twenty Postclassic ceramic collections from Xochicalco, the groups are the four phases defined above, and the variables are the seriation variables). Group membership is defined beforehand, and information on which group each case belongs to is fed into the discriminant analysis program along with scores of each case on each variable. Discriminant analysis first finds that linear combination of the variables which maximizes between-group variance and minimizes within-group variance; i.e. it defines a function that maximizes the separation or discrimination among the groups. After this first discriminant function has been defined, a second function is extracted which maximizes discrimination using the variance not accounted for by the first function. This process continues until the maximum number of functions (equal to the number of groups minus one) have been found. It is possible to calculate a measure of the proportion of variability attributable to differences among the groups. This measure, called the total discriminatory power, may be interpreted as the degree to which it is possible to distinguish among the groups using the

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variables. A high value means that the groups are quite distinct based upon the variables chosen, while a low value implies that the variables are not good indicators of differences between the groups.

In the present application, the first question was whether and to what degree can the seriation variables discriminate between the four phases. Since the phases were defined on the basis of the time-curve, which represents similarity between collections as measured by the variables, a relatively high degree of discrimination is assured. However, the greater the total discriminatory power, the more faith that can be placed in the phase divisions proposed above. Specifically, if the distinction between the Early and Late Facets of the Cuauhnáhuac phase is not very clear, then this should be reflected in the discriminant analysis by a smaller distance between these two groups when theyare plotted on their scores on the discriminant functions. Second, because a discriminant function may be interpreted as a special kind of factor comparable to those produced by factor analysis, it may be possible to discern a temporal ordering of the groups in a plot of their function scores. It may turn out that the first (and most powerful) function represents the temporal dimension in that the Tilancingo, Temazcalli and Early Cuauhnáhuac groups are arranged in a linear fashion along that function. In such a situation, if the Late Cucuhnáhuac group is arranged along the same axis at the late end of the sequence, then the temporal interpretation of the Early/Late Cuauhnáhuac division is strengthened.

In the process of analyzing group differences, discriminant analysis calculates a "mean" score for each group on the discriminant functions. These scores, known as the group centroids, may be plotted geometrically

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using the discriminant functions as axes; this can help reveal the nature of the relationships among the groups. In the second or classification phase of discriminant analysis, the values of the variables of each case are applied to the discriminant functions, and each case is thereby given a score on each function. These scores are then compared to the group centroids, and the case is classified into whichever group its scores most resemble. In a successful discriminant analysis, all or most cases will be classified into their original group. A high number of cases that are switched from one group to another ("misclassifications"), indicating their greater similarity to some group other than the one they were assigned to, is a sign of poor discrimination, poor group definition, or both. Further information on discriminant analysis may be found in Tatsuoka (1970) or Nie et al. (1975:434-467).

Discriminant analysis of the Xochicalco Postclassic ceramic collections was carried out using the DISCRIM program of SPSS (Nie et al. 1975: 434-467). The "direct" method was used, and all 32 seriation variables were included initially. Results of the analysis are presented in Table 26. It can be seen that the total discriminatory power is very high (.99986, calculated from the formula in Tatsuoka 1970:48), indicating that the four phases are quite distinct based upon the variables used. Of the 32 seriation variables entered into the discriminant analysis program, only 16 were retained for use in the discriminant functions. The remaining 16 failed the "tolerance" test (Nie et al. 1975:453), meaning that they had a certain number of high correlations with the retained variables and thus did not contribute anything new or distinctive to the analysis. Their elimination makes the computations more efficient while not sacrificing

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TABLE 26

DISCRIMINANT ANALYSIS RESULTS

	Discriminant Function 1	Discriminant Function 2
A. Standardized Discriminant Function Coefficients		
Variables:		
LATEAZ1	- 4.57	1.48
GUERO1	- 2.08	.67
TOLUCA1	2.91	.47
TEOPAN1	- .36	-1.14
BTYPES2	3.40	-1.82
DECTOT1	.13	1.55
DECOLT1	1.11	-1.52
GNDA1	2.92	-1.60
OLFORM4	- 5.14	.85
CMELEV4	2.16	- .24
CMANGL4	- 1.25	.15
PBLFORM3	4.63	-1.97
PBCMPLX2	3.98	- .29
DBCMPLX2	- 4.24	.52
OLPOL3	- 2.15	- .49
OLBLK2	3.86	.09
B. Eigenvalues		
Eigenvalue	122.49	9.82
% of total variance	88.96%	7.14%
C. Group Centroids in Discriminat Space (see Figure 21)		
Group 1 (Tilancingo)	5.06	4.31
Group 2 (Temazcalli)	9.74	-1.60
Group 3 (Early Cuauh)	- 2.75	-3.04
Group 4 (Late Cuauh)	-17.50	.82
D. Total Discriminatory Power of all Functions: .99986		

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discriminatory information. The relative contributions of the three functions to group discrimination are calculated on the basis of their eigenvalues (a measure of discriminatory power); the first function is by far the most powerful, accounting for 88.96% of the total discrimination (Table 26). Because the third function explains only 3.9% of the total variance, it is not considered further here.

The group centroids (listed in Table 26) are plotted in the "discriminant space" defined by the first two functions, as are the individual collections' scores on these functions, in Figure 19. It can be seen that the four groups are well separated, and that their constituent collections are closely clustered around each centroid. In the classification phase, all 20 cases were correctly assigned to their original group, indicating further the high degree of separation of the four phases. The centroids of the two facets of the Cuauhnáhuac phase (Groups 3 and 4) are further apart than are those of the other adjacent phases (Figure 19). This gives further support to the validity of the division, but says nothing as to its temporal or other meaning. The first function, which accounts for most of the group discrimination (89%), does not measure time in a simple fashion for the whole Postclassic epoch, since the ordering from high to low is: Groups 2, 1, 3, and 4. However, if only the final or "Tlahuica" phases of the sequence are considered (ignoring Group 1 for now), then function 1 effectively separates Groups 2 and 3 and may thus be interpreted as a temporal dimension for this portion of the sequence. As such, Group 4 is located along this dimension at the late end, providing support for the interpretation of the Early/Late Cuauhnáhuac distinction as a temporal one.

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Figure 19. Discriminant function plot of Xochicalco Postclassic collections.

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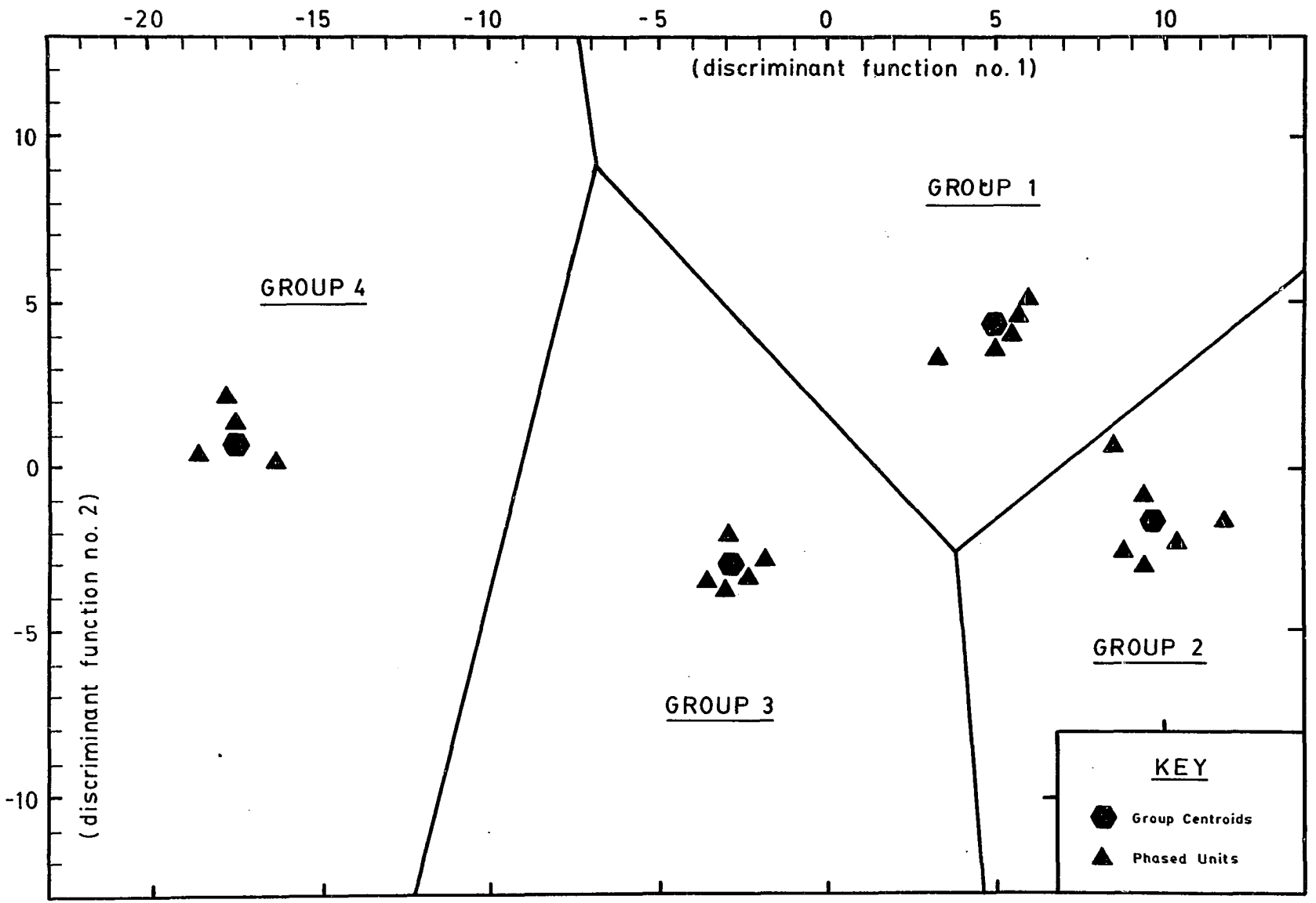

The full utility of discriminant analysis in the evaluation of the Xochicalco seriation, however, lies in its ability to classify cases not used in the definition of the functions and group centroids. Thus given the relationships among the phases at Xochicalco defined by the 20 key proveniences, additional collections (if scored on the same variables) can be classified to see what phase they fall into. This procedure is carried out with Postclassic ceramics from the nearby site of Coatetelco.

Extension of the Seriation to Coatetelco, Morelos

Ceramics recovered from stratigraphic excavations at the Late Postclassic site of Coatetelco, Morelos, provide support for the proposed division of the Cuauhnáhuac phase into an Early and a Late facet. A number of one meter square test pits were excavated at Coatetelco in 1975 by Arqueólogo Raúl Arana as part of his multi-season program of fieldwork at the site (Arana 1976; Arana and Denis 1977). Ceramics from these pits were examined by the author in 1980, and material from three excavations (01, 02, and 09) was chosen for quantification on the basis of collection size and stratigraphic documentation. Except for an elaborate Classic period burial, Coatetelco is an exclusively Late Postclassic site, with considerable ceremonial construction and several rich graves dating to the Cuauhnáhuac phase. It was hoped that the stratigraphic deposits would provide a record of change within the Cuauhnáhuac phase to supplement the material excavated at Xochicalco. Full descriptions of the Coatetelco excavations await completion of the site report, and descriptions of the ceramics from the burials and test pits will be presented elsewhere (Smith n.d.). At this point, only data of direct relevance to the Xochicalco seriation is presented.

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The deepest test pits at Coatetelco are pits 01 and 02. Pit 01 was excavated first in 10 cm metric levels, and then pit 02 was placed immediately north of 01 and dug by natural stratigraphy (see Figure 20). The top 50 cm of this double excavation, divided into three capas (I, II and IIIA), comprised the zone of plow disturbance. These levels were not quantified because of the small numbers and the small sizes of sherds (which average less than 5 grams apiece). Capas IIIB and IV are undisturbed refuse deposits, quantified as units 22, 23 and 24. The depositional history of the excavation below Capa IV is not entirely clear due to a lack of documentation beyond profile drawings. At the bottom of the excavation is a pit dug nearly one meter into the tepetate. The primary pit fill, designated as Capa IX, is divided arbitrarily into two level in pit 01 for quantification. An upper capa of fill, Capa VII, clearly postdates Capa IX and predates Capa IV, but its relationship with the lowest occupation level (Capa V) is uncertain. These two capas lie at the same depth, and probably both post-date IX and predate IV, so it is likely that they represent the same period of deposition. Capas VI and VIII are labelled in the profiles as "loose" tepetate, but it is not clear whether they represent natural or cultural deposits. The lack of artifactual remains in these levels favors the former interpretation. To summarize this somewhat vague stratigraphic situation, the ceramic-bearing levels may be divided into three groups. The lower pit fill (Capa IX) probably represents the earliest deposit, although it could conceivably postdate Capa V. Capas V and VII fall between Capas IX and IV, and comprise the middle group, while Capas IIIA and IV represent the uppermost and latest of the quantified deposits.

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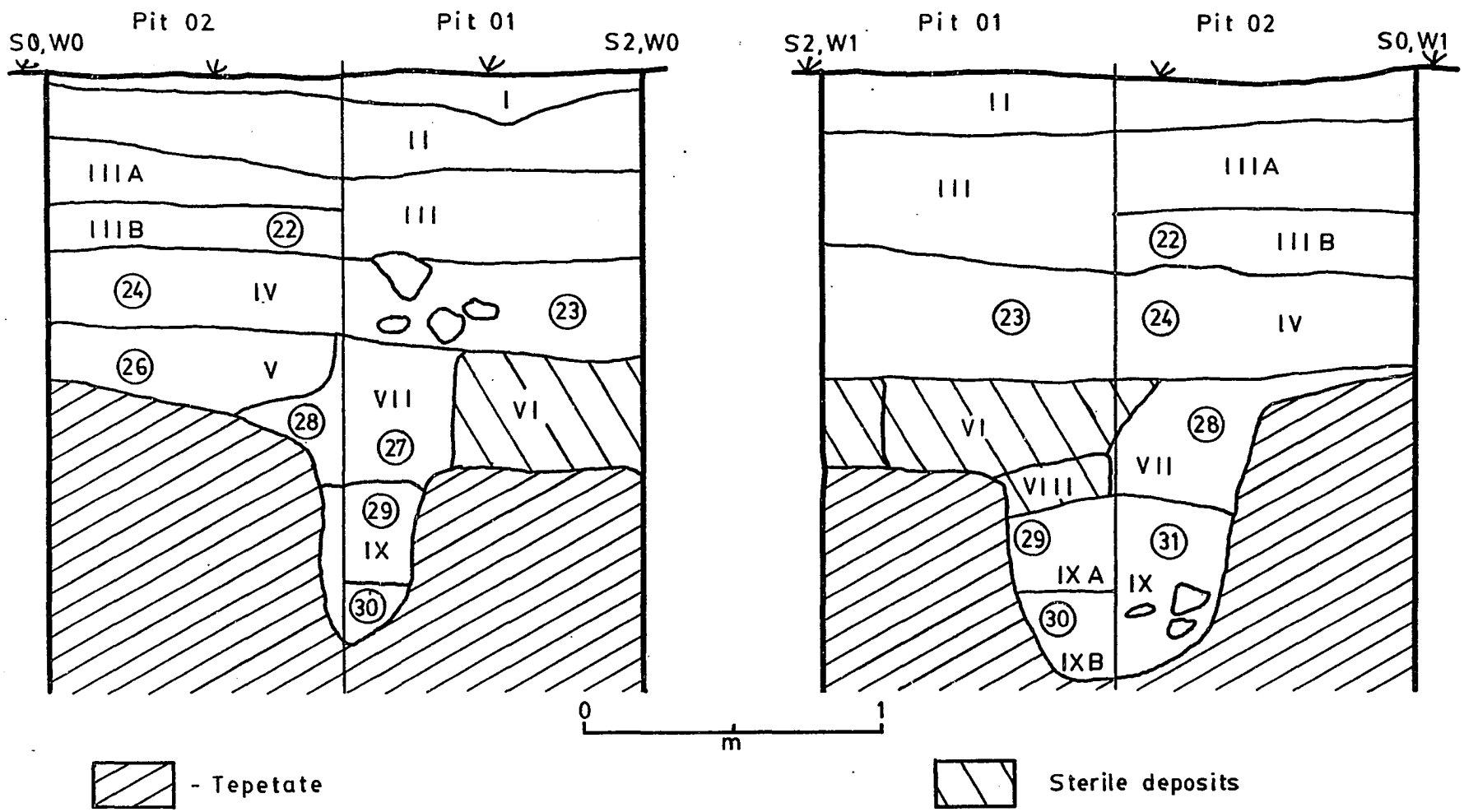

Figure 20. Profile of Pits 01 and 02, Coatetelco, Morelos (East and West walls).

Excavation 09 is a one meter square pit excavated in 10 cm levels. Capas I and II are described in the field notes as forming a single cultural deposit and were hence combined as a single unit (no. 32) for quantification. The only remaining levels of this one meter deep excavation that did not contain a mixture of capas are levels 3 and 5, quantified as units 33 and 34, respectively. Documentation was not available for Excavation 03, but a dense deposit from Capa III was quantified for comparative purposes (unit no. 21). Basic data on the 13 quantified deposits from Coatetelco are listed in Table 27. Four collections--nos. 22, 27, 28, and 34--contain fewer than 100 sherds and must therefore be seen as less than optimal for quantitative seriation.

The initial seriation of western Morelos Postclassic deposits was carried out on all 34 collections from both Xochicalco and Coatetelco. The sites are clearly part of the same cultural tradition, and it was thought that the distance between them (7.5 km) was not sufficient to violate the seriation requirement of collections coming from a single local area. The two-dimensional configuration of the first multidimensional scaling proved this assumption wrong, however. The Xochicalco deposits were arranged more or less temporally in a linear fashion (with some inversions and problems), while the Coatetelco collections were grouped off to one side in no apparent temporal order. At that point, collections from the two sites were separated and scalings run independently on each site. The Xochicalco seriation is described above, and the Coatetelco counterpart is presented in Figure 21.

The Coatetelco scaling is far less successful than is the Xochicalco seriation. The Stress value is higher (Stress = .301; r-squared = .513),

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TABLE 27

COATETELCO SERIATION DEPOSITS

Pit	Unit No.	Capa	Depth (cm)	No. of sherds
01	23	IV	70-100	209
01	27	VII	110-120	51
01	29	IXA	160-180	212
01	30	IXB	180-215	243
02	22	IIIB	(see Fig. 19)	74
02	24	IV	(see Fig. 19)	266
02	26	V	(see Fig. 19)	244
02	28	VII	(see Fig. 19)	53
02	31	IX	(see Fig. 19)	100
03	21	III	unknown	448
09	32	I/II	0-20	110
09	33	III	20-30	140
09	34	IV	40-50	70

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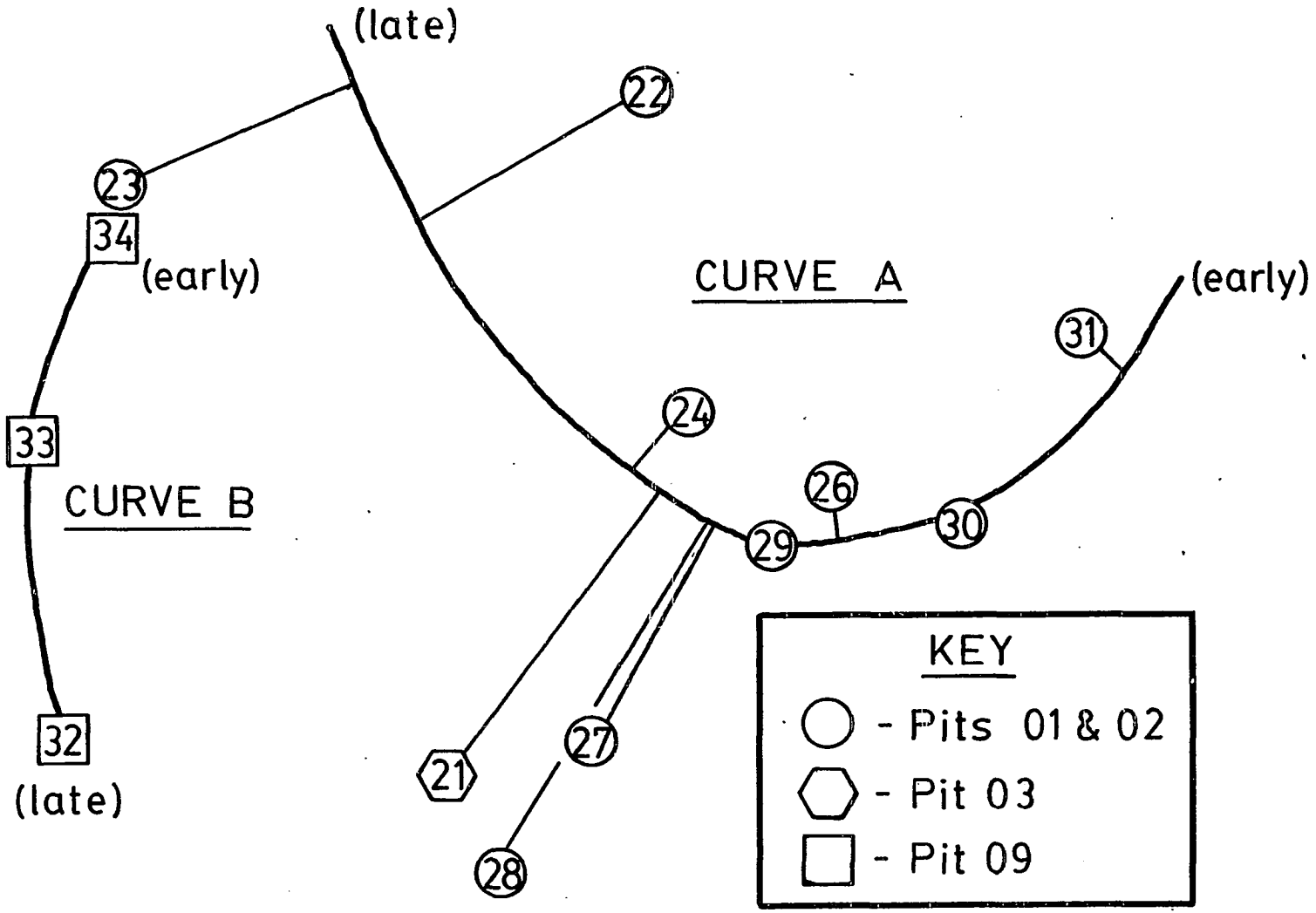

Figure 21. Two dimensional scaling plot of Coatetelco collections with inferred seriation time-curves. See Table 27 for a key to the numbered collections.

and separate curves are necessary to model pits 01/02 (Curve A) and pit 09 (Curve B). The structure in Figure 21 is not exhibited when lines of high similarity are drawn, and deposits from the same capa of adjacent pits are spread apart (29, 30, and 31; 27 and 28). In spite of these problems, Curve A does preserve the ordering of the three groups of lower, middle, and upper deposits in pits 01/02 with only one exception (unit 26), while Curve B preserves the bottom to top sequence in pit 09. There are two possible explanations for this vague but suggestive configuration. Either there is no discernable chronological structure in pits 01/02 (i.e. the deposition was too rapid to monitor with seriation), and the results in Figure 21 are fortuitous; or else chronological structure does exist, but it is not expressed in a clear fashion because of distorting factors. Since two obvious distorting factors are present, the latter interpretation is more probable. First, the sizes of the collections from Coatetelco are small--the mean is 170.8 sherds, and four collections are under 100. Second, the same set of variables was used to seriate both the Xochicalco and the Coatetelco data sets. These variables were chosen to reflect chronological change throughout the whole Postclassic epoch, whereas the Coatetelco collections represent only the final one-third or so of that sequence. A more refined seriation may be possible with a focus on variables relevant to only the Late Postclassic period, but this was not attempted.

This suggestion of the presence of chronological structure in the Coatetelco collections may be investigated further through an extension of the discriminant analysis presented above. The thirteen collections from Coatetelco were classified through the discriminant functions extracted from the Xochicalco data. This procedure results in the classification of

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the Coatetelco collections as follows: six units included with Group 4; six with Group 3; and one with Group 2. It can be seen in the plot of these collections on the Xochicalco discriminant functions (Figure 22) that function 1, interpreted above as a temporal dimension for the latter part of the Postclassic sequence, preserves generally the stratigraphic order of pits 01/02. The three groups of levels defined above for this excavation are arranged in temporal order along the first function. The mean scores of the three stratigraphic groups on this function are: 0.96 for the lower levels (29, 30, 31); -11.62 for the middle levels (26, 27, 28); and -19.24 for the top levels (22, 23, 24). One of the lower levels was classified into Group 2, in line with a number of Temazcalli phase markers found in this collection.

This stratigraphic ordering along function 1 strengthens considerably its interpretation as a temporal function, thus supporting the view that the Early/Late Cuauhnáhuac division (distinguished in the discriminant analysis primarily by function 1) is in fact a temporal division and not caused by other factors. If the differences between the Early and Late Cuauhnáhuac collections at Xochicalco were due to non-temporal factors, then their separation by function 1 would not be expected to mirror the temporally-based stratigraphic changes at Coatetelco.

Conclusions

The success of the seriation presented above is revealed by both stratigraphic criteria and the graphic portrayal of the similarity data in Figure 17. While the ordered sequence is shown to be accurate in

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Figure 22. Discriminant function plot of Xochicalco Postclassic collections, showing results of the classification of Coatetelco collections. See Table 27 for a key to the numbered collections.

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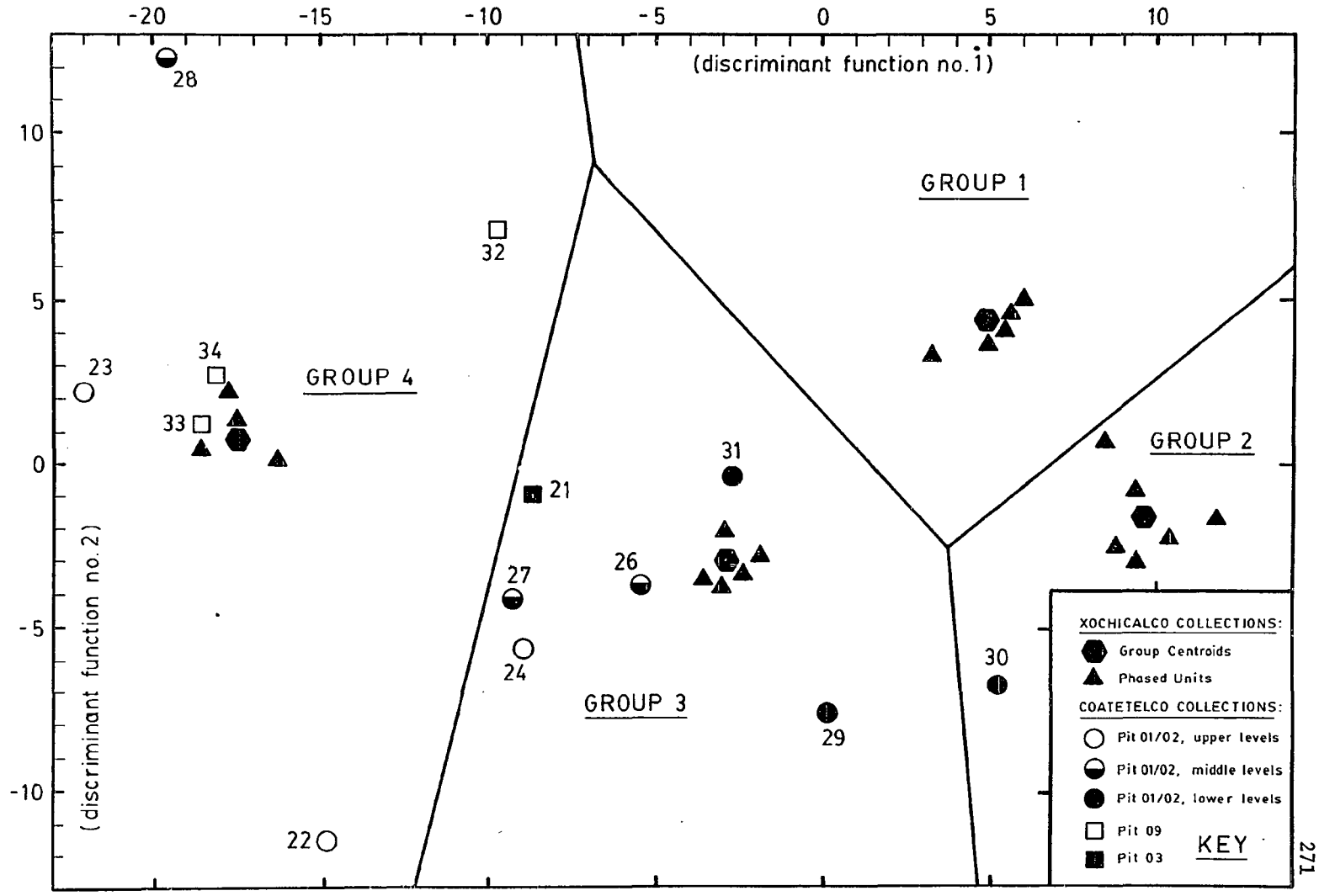

overall configuration, it is probably not a very precise sequence. This lack of precision, coupled with small collection sizes, necessitates its periodification. The distinctiveness of the four phases (Tilancingo, Temazcalli, Early Cuauhnáhuac, and Late Cuauhnáhuac) is confirmed through discriminant analysis, and an extension of the seriation to the site of Coatetelco supports a temporal interpretation of the Early/Late Cuauhnáhuac phase division. The seriation therefore fulfills the two goals stated at the beginning of the chapter. First, the collections from separate excavations have been successfully integrated into a single chronological sequence. Second and more important, that sequence has been refined by subdivision into four phases in place of the three defined in the preliminary chronology of 1980.

The success of this seriation can be attributed in large part to the techniques employed. These techniques represent an extension of the recent trend toward non-typological quantitative seriation as embodied in the work of LeBlanc, Drennan and Marquardt. This trend involves the application of sophisticated numerical techniques to chronological seriation without the reliance upon typological analysis characteristic of most previous quantitative seriation studies. The present endeavour goes beyond previous seriation methodology in its greater attention to the units and variables involved, and in the more detailed consideration of the notion of precision and the effects of sample size upon the seriation.

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Notes

[1]The 22 collections seriated by Drennan (1976b:45; Appendix I) average 230.0 sherds a piece; five collections contain fewer than 100 sherds. LeBlanc (1975) does not provide information on his collection sizes, although it may be possible to calculate an average figure. His Table 1 presents data on "a sample of Cibola pottery" (p. 26). If this sample corresponds to the 26 units seriated (Table 4), then the mean collection size is only 31.3 sherds.

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CHAPTER 6

POSTCLASSIC CERAMIC COMPLEXES OF XOCHICALCO

This chapter presents descriptions of the Postclassic ceramics of Xochicalco, arranged by ceramic complex. These descriptions are structured by a cultural/functional classification which is designed to account for a major portion of the culturally significant variation within the ceramics of each complex. Before presenting the actual descriptions, my approach to synchronic ceramic analysis is described along with the derivation of the cultural/functional classification. After all of the ceramics have been described, a number of economic implications of the data are suggested in the concluding section of the chapter.

Synchronic Ceramic Analysis: Introduction

Conceptual Framework

The basic approach to understanding synchronic ceramic variability followed here was developed by Lathrap (1962:214-254), who synthesized earlier work on ceramic analysis by Rouse (1939), Rowe (1959), Spaulding (1960) and others. This conceptual framework, which may be referred to as modal analysis, has since been expanded and refined through application to both archaeological (Raymond, DeBoer and Roe 1975; Isbell 1977; Kennedy 1981) and ethnographic (DeBoer and Lathrap 1979) ceramics. The key concepts of modal analysis are the attribute, mode and dimension. The succeeding sections of this chapter rely upon these three concepts plus the notions of ceramic complex, form class, and decorative class.

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A ceramic attribute may be defined as "any distinction or cluster of distinctions which can be used consistently and objectively as a sorting criterion" (Lathrap 1962:49-50). Lathrap uses the term "ceramic feature" for what I am calling an attribute. His definition is meant to include part of what Rowe (1959:320) meant by the term feature; the remainder of Rowe's feature notion is referred to by Lathrap as a mode. In Lathrap's terms, a mode is "a distinction which was consistently made in the minds of the potters of a face to face social group" (1962:50), and may be interpreted as "a minimum unit of meaningful behavior with regard to material culture" (1962:218). A mode is an attribute which has been inferred through statistical or other means to have cultural significance. This usage, which derives from Rouse's initial formulation (1939; see also 1960), should be distinguished from Dunnell's definition of mode as "an intuitive cultural class of attributes of discreet objects" (1971a:156). While Dunnell admits the cultural basis of modes, he sees this as a "problem" because the cultural dimension cannot be observed but must be inferred or assumed to exist. He goes on to treat modes as classes of attributes, just as types are classes of artifacts; thus the mode is viewed by Dunnell as simply one level in a master hierarchy of archaeological taxonomy.

The third basic concept of modal analysis is the dimension, whose definition follows Spaulding's general treatment as "an aspect or property of the subject matter which requires its own measuring device" (1960:438). In reference to ceramics, Lathrap defines a dimension as "any axis or range within which ceramic material may show formal variability" (1962:223). Again following Spaulding (1960:440), Lathrap describes the relationship of modes and dimensions as follows: "modes are clusterings of the data along

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a particular dimension involved in a ceramic analysis" (1962:226). Thus ceramic variability may be analyzed in terms of independent dimensions, each of which exhibits one or more modes. This usage is somewhat different from that of Whallon (1982), who makes a distinction between variables, which are empirical entities that can be easily measured and described, and dimensions, which are significant underlying axes of variability not necessarily amenable to direct measurement.

Because modes represent past cultural behavior, they can only be defined for a given past culture; that is, modes have meaning only in reference to a group of artifacts of limited spatial and temporal extent. Whereas attributes can be defined on the basis of any collection of artifacts without reference to space or time, modes cannot be defined until chronological and spatial variability have been eliminated (or at least minimized); Lathrap (1962:217-222) discusses this issue in terms of the distinction between collections (mixed space and time) and assemblages (limited space and time).

The sum total of the ceramic modes and dimensions utilized at a given time in a given area may be referred to as a ceramic complex. Lathrap's definition of this unit is, "a body of pottery which was made by a face to face social group over a relatively short period of time" (1962:48). In contrast to this "abstract" definition, he gives the following "operational" definition of a ceramic complex: "any series of ceramic features [i.e. attributes] . . . which share the same pattern of horizontal and vertical distribution through a series of stratigraphic cuts" (cf. Willey, Culbert and Adams 1967:364 for a similar definition). Thus ceramic complexes may be isolated through seriation and other techniques

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on the basis of attributes alone; once isolated, a complex may then be given formal definition through specification of its constituent dimensions and modes and their interrelationships. Such a procedure is followed here. Periodification of the seriated sequence in Chapter 5 produced five units which were referred to as phases. These five units (with the possible exception of Phase H, which is represented by only 43 sherds) in fact constitute ceramic complexes in the operational sense defined above. The task of the present chapter is to give these complexes formal definitions with reference to modes and dimensions, and in the process to make inferences concerning the past cultures that produced and used the ceramics of each complex.

Modification of the Framework

The conceptual framework described above was formulated for use in the study of unstratified, small-scale social systems where the makers and users of pottery are either the same people or else members of the same local, "face to face" community (see Lathrap 1962:217ff). Some modification of this framework is required, however, when it is applied to socially stratified, state-level societies where ceramics are manufactured by full-time specialists and widely traded through market systems. These changes are not needed so much in the methodological implications of the approach, but rather in the cultural definitions of concepts (and hence in the cultural inferences that may be drawn from modal analysis). The operational definition of a ceramic complex given above (Lathrap 1962:48; see also Willey, Culbert and Adams 1967:364) is independent of the socio-economic context in which pottery is produced and therefore applies equally

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well to the two situations; however, the cultural definition of a complex is quite different and requires restatement for state level societies. In a system of specialized ceramic production and economic distribution beyond a single community, the existence of a ceramic complex is not due to the cohesiveness of a "face to face social group" (Lathrap 1962:48) but rather to the cohesiveness or homogenizing tendencies of some larger institution such as a regional marketing system (see Blanton et al. 1981:30). Lathrap's definition of a mode as "a distinction that was consistently made in the minds of the potters" (see above) requires no modification, although his stipulation that the potters be members of a particular social group is not retained. Rather, the potters must participate in the same market system, or else be members of some alternative integrated production-distribution network. Keeping these differences in mind, the methodology of synchronic analysis is now described. Inferences concerning specialized production and marketplace distribution are addressed in the concluding section of the chapter.

The Cultural/Functional Classification

In the analysis and description of ceramics pertaining to a single ceramic complex, there is general agreement among most archaeologists that culturally significant categories are best identified by the search for non-random variation in the data. This procedure can consist of the isolation of significant modes along individual dimensions (Lathrap 1962:214-254; Cowgill 1982:49), but a more common and powerful method lies in the identification of significant associations among the modes of separate dimensions (DeBoer and Lathrap 1979; Raymond, DeBoer and Roe 1975). This latter procedure is often approached statistically, using the chi-square or other

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statistics to demonstrate non-random associations among the dimensions (e.g. Spaulding 1982; Cowgill 1982; Whallon 1982); however, culturally significant associations between ceramic dimensions are often so strong and so obvious that a statistical approach is superfluous (see the studies of DeBoer and Lathrap 1979 or Raymond, DeBoer and Roe 1975). Such is the case with the Postclassic ceramics of Xochicalco in terms of the definition of the form classes mentioned in Chapter 4.

The four form classes identified in Chapter 4--comal, basin, olla, and bowl--plus the plato, together comprise over 95% of the sherds in each complex at Xochicalco and may be regarded as culturally significant categories. This inference is based upon: (1) significant associations among ceramic dimensions defining the form classes; (2) functional interpretation of the form classes by specific analogy with contemporary Mesoamerican ceramics; (3) general analogy with ethnographically known ceramic using cultures where form classes have strong cultural significance (see especially Kempton 1981; Whitten 1981; DeBoer and Lathrap 1979; Kelley and Orr 1976; Lathrap 1962:236; and Bunzel 1929:13-48); and (4) the distinctiveness and temporal persistence of the five form classes at Xochicalco. Operational definitions of the form classes are given in Chapter 4 (e.g. how to tell a basin sherd from a bowl sherd); formal definitions are provided below. Although culturally significant categories such as modes can only be defined for a given time and place, and are thus different for each ceramic complex (Lathrap 1962:217-222; Read 1982:63f,70; see Chapters 4 and 5 above), the five form classes discussed here are found in all of the Postclassic complexes at Xochicalco and their formal definitions may therefore be stated prior to the descriptions of individual complexes.

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The cultural/functional classification is presented in Table 28. The form classes, inferred as culturally significant in each phase (see below) are defined primarily in terms of function. The kind of surface finish used on each form class (painted versus plain) is also indicated. This dimension has both functional and cultural determinants: cooking vessels are never painted, platos are always painted, and other vessels may or may not be painted. The painted vessels exhibit considerable stylistic variation, although much of this falls into easily recognized standardized clusters. These clusters, plus groups of nonstandardized decorated vessels sharing various decorative attributes, are referred to below as decorative classes.

The five basic form classes may be formally defined as follows.

1. Comal: Comals are slightly concave open vessels finished on the interior surface only; the exterior is either unsmoothed or deliberately roughened. Their rim profiles are quite distinctive (see Appendix A), and comals never have handles or supports. Their interior surface may be slipped or unslipped, but is never painted. There is complete formal continuity between modern and Prehispanic comals in terms of form and surface attributes, and thus the modern function of comals--to cook tortillas (Reina and Hill 1978; Edson 1979; Lackey 1982)--may be projected back to Prehispanic examples as well.

2. Basin: Basins are large thick-walled open vessels, finished on both the interior and exterior, and they are never painted. All archaeological examples from Postclassic Morelos have two horizontal handles (either solid tab handles or loop handles), and nearly all examples have everted rims. In size and form, basins closely resemble the modern Mexican

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TABLE 28

CULTURAL/FUNCTIONAL CLASSIFICATION FOR POSTCLASSIC CERAMICS FROM XOCHICALCO

FUNCTION OR USE	FORM CLASS	DECORATION[a]
A. Cooking	Comal	Plain
	Basin	Plain
	Olla	Plain
B. Storage/Transport	Olla	Plain
		Painted
C. Serving	Bowl	Plain
		Painted
	Plato	Painted
	Pitcher	Painted
	Copa	Painted
D. Special Purpose		
Salt Container	Basin(?)	Fabric-Impressed
Incensario	Sahumador	Plain
	Other	Plain, White Slip
Spindle Whorl	Disk	Plain
Figurine	Special	Plain

[a]Plain designates slipped or unslipped vessels that are not painted.

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form called a cazuela, which is used for cooking purposes (frying and sauce-making; see Rojas 1973; Edson 1979; Lackey 1982). By analogy, a cooking function may be assigned to the Postclassic basins; this is strengthened by their lack of painting and the presence of horizontal handles for use over a fire (most modern cazuelas have horizontal handles, although some examples with vertical handles are known; see the references listed above).

3. Olla: On the basis of ethnographic analogy, vessels designated in the analysis as ollas--globular forms with a restricted neck--include two distinct functional classes. First, some of them probably pertain to modern "ollas," which are cooking vessels, while others must correspond to modern "cántaros" or "tinajas," which have storage and/or transport functions (Reina and Hill 1978; Edson 1979; Lackey 1982). It is assumed that painted ollas were not used for cooking. It is only the plain olla category, therefore, which covers the two functions. Although functional analysis of ceramics is not a major part of the present study, some effort is made to distinguish cooking ollas from storage/transport ollas on the basis of certain functional modes. First, for the same reasons that cooking vessels are not painted (first, use over the fire will damage a painted finish; and second, vessels used in private domestic contexts generally receive less care and effort in finishing than vessels used in more public, visible contexts--see Wobst 1978; Lischka 1978:227), plain cooking ollas are expected to exhibit less effort in finishing and treatment than are plain storage/transport ollas. Thus cooking ollas are more likely to be unslipped and to show less polishing. Second, ollas for transport purposes usually have vertical loop handles for ease in carrying (either by hand or with a

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rope), while cooking ollas, like cazuelas or basins, most often have horizontal handles for manipulation around the fire (see Reina and Hill 1978; Edson 1979; Rojas 1973). Finally, cooking ollas tend to have wide mouths for easy access to the contents, while storage and transport vessels usually have restricted openings for efficiency (see the above references). These functional associations, derived from studies of contemporary Mesoamerican pottery, are evaluated for the plain ollas of each complex by comparing slipped and unslipped examples in terms of their surface treatment, handle orientation, and rim diameter.

4. Bowl: Bowls are thin walled open vessels whose function as serving vessels in inferred through analogy with contemporary "cajetes" or "platos" (Reina and Hill 1978). As serving vessels, bowls have a more public or visible use context than the cooking vessels, and as such are expected to show a higher degree of workmanship and greater stylistic elaboration (Wobst 1978; Lischka 1978:227). This is indeed the case at Xochicalco, where there are a number of distinct classes of bowls with painted decoration. The plain/painted distinction is evidently significant, since with the exception of a specialized miniature form, plain bowls never have supports while a number of classes of decorated bowls do; similarly, there are associations between different decorative classes, plain bowls, and specific bowl forms.

5. Plato: This is a relatively rare specialized class of serving vessel with no close contemporary counterpart (outside of the tourist trade). Platos are particularly shallow bowls and all partial or complete vessels from Post-classic Morelos have tripod supports. Platos are always painted, and their decoration in all cases matches some class of painted bowl. For this reason, platos and bowls are grouped together by decorative class for descriptive

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purposes. This practice alleviates the problem mentioned in Chapter 4 of distinguishing between plato and bowl body sherds and supports. Platos were originally considered as a subclass of bowl form, but were subsequently elevated to a form class with presumed cultural significance because: (1) unlike all other bowls form subclasses, platos are never found without painted decoration; and (2) whereas decorated bowls rarely have tripod supports, all platos large enough to determine their presence do indeed have supports.

6. Pitcher and Copa: These are rare specialized serving vessels found only in the Guinda decorative class. A pitcher is similar to an olla in being a globular form with a restricted neck, finished on the exterior only, but differs in having a single long vertical loop handle and a spout on the rim opposite the handle; its function as a beverage serving vessel is inferred by analogy with modern "jarros" and "jarras" of Mexico (Kempton 1981; Edson 1979). A copa is a tall open vessel with a high annular support. It is always painted on the exterior surface, while the interior receptacle is unslipped and polished or burnished and the interior base is unslipped and unsmoothed. Its function as a drinking cup is based on analogy with modern forms (personal observations of the author).

7. Special Purpose Vessels: This category is a catch-all for any ceramic item not classed as a cooking, storage/transport or serving vessel (although the Texcoco Fabric Marked type, which functioned as a salt transport container, is an exception, it is included because of its non-local origin and highly specialized function). These classes are discussed under the appropriate ceramic complex.

In the ceramic descriptions which follow, painted ollas and painted bowls are each subdivided into decorative classes. These categories,

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together with the unpainted form classes and the special purpose vessels, comprise mutually exclusive and exhaustive descriptive classes. Description of the ceramics of each complex is organized around the descriptive classes. Color conventions used in the ceramic illustrations are shown in Figure 23.

Ceramics of Phase H

Deposits dating to Phase H were recovered only in provenience unit 17, which produced a total of 43 sherds. Descriptive classes for these ceramics are listed in Table 29.

Cooking Vessels (A)

Comals (A.1; n=2)

Two comal bodies were recovered in unit 17. Both have orange paste of medium texture; one is unslipped and the other has a black slipped interior.

Basins (A.2; n=1)

One basin rim was recovered from unit 17. Although it has a smaller opening diameter than most basins (20 cm.), it does have a typical basin rim form and wall thickness (Figure 24,A). The sherd has a partially oxidized coarse orange paste, and the interior surface exhibits a partially burnished brown slip; the exterior is smoothed and unslipped.

Plain Ollas (A.3; n=3)

The three quantified olla rims have coarse orange and buff paste. They all represent relatively unusual forms compared to later Postclassic examples; the Phase H ollas can be classified in the Postclassic form chart, however, as Forms 111, 114 and 126 (see Figure 24B, C, and D). The first has polished brown slip, while the others have smoothed unslipped surfaces.

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TABLE 29

DESCRIPTIVE CLASSES FOR PHASE H CERAMICS

	Descriptive Class	Sherds with attribute data			Additional sherds
		Total	Rims	Bodies/ Appendages	
	A. Cooking Vessels				
A.1	Comal	-	-	-	2
A.2	Basin	1	1	-	-
A.3	Plain Olla	3	3	-	23
	C. Serving Vessels				
C.1	Plain Bowl	3	3	-	6
C.2	Red-on-Buff	4	2	2	-
C.3	Fine Orange	-	-	-	1
TOTAL COUNTS (Total sherds: 43)		11	9	2	32

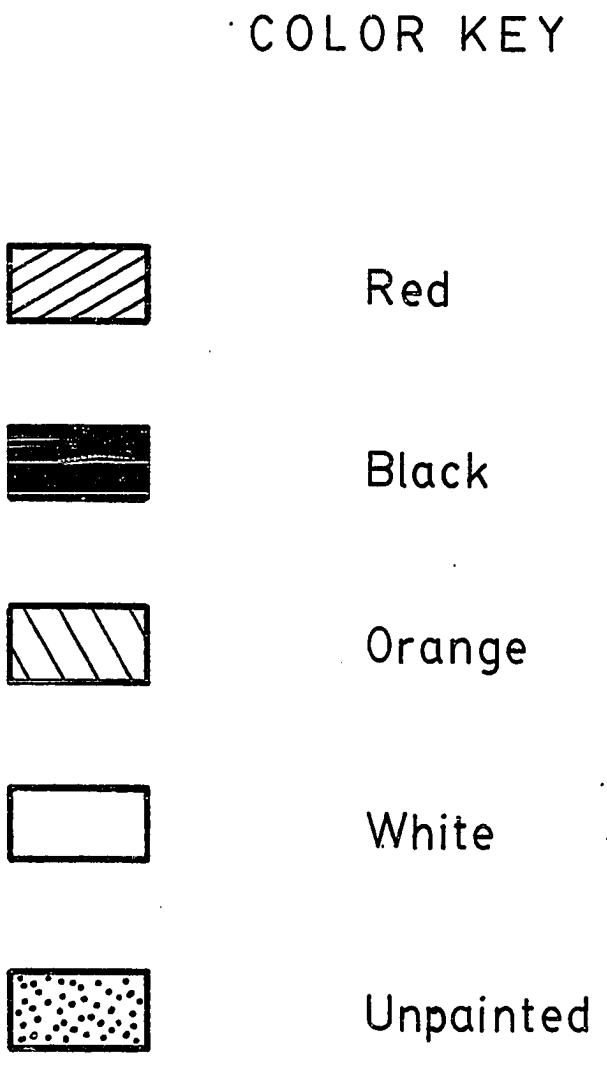

Figure 23. Color key for illustrations of painted ceramics. These conventions are followed in all illustrations except Figure 25, where black is used to indicate red painting. The surfaces of unpainted vessels (both slipped and unslipped) are left blank in the illustrations.

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Figure 24. Ceramics of Phase H. A, basin (17-6, 223); B-D, ollas, B (17-4, 111), C (17-2, 114), D (17-1, 126); E-F, bowls, E (17-5, 308), F (17-3, 301); G, Red-on-Buff bowl (17-8, 308); H, Red-on-Buff support (17-11). In this and following figure captions, the numbers in parentheses indicate the provenience and vessel form of illustrated sherds. Hyphenated provenience designations include collection number followed by sherd number.

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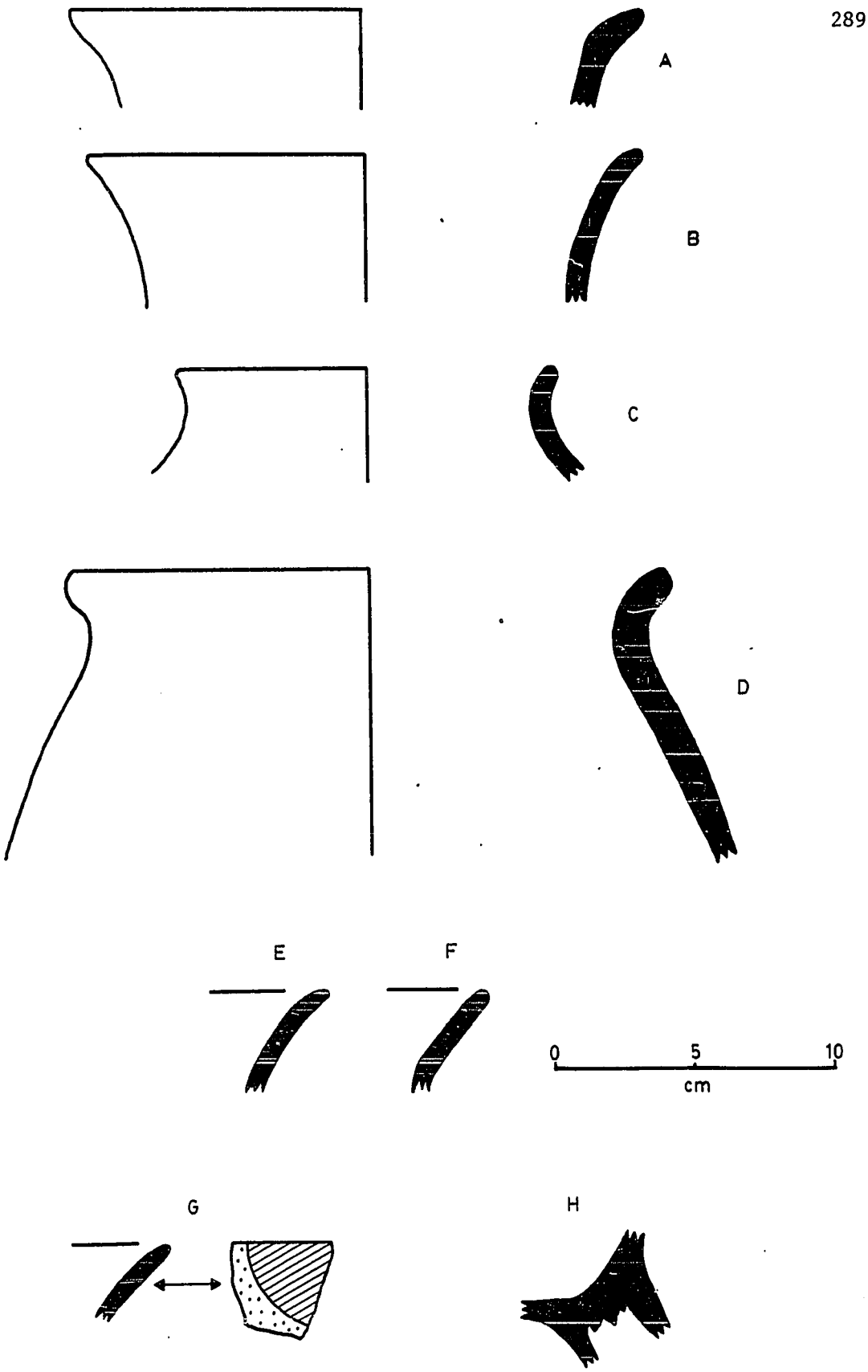

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Among the olla body sherds present, 8 are unslipped, 3 have orange slip, and 12 have brown slip.

Serving Vessels (C)

Plain Bowls (C.1; n=3)

One of the plain bowl rims is a hemispherical form (315) with medium texture brown paste and brown slip (polished interior and burnished exterior). The other two rims have orange paste and polished orange slip, and represent unusual forms. The first is outcurving (Form 308; Figure 24,E), while the second is a strange bent flaring form (coded as "odd"--Form 301; Figure 24,F). Three of the uncoded bowl bodies have orange slip and the other three exhibit brown slip.

Red-on-Buff (C.2; n=4)

This class includes all of the decorated sherds recovered from unit 17. One example appears to have red paint on a cream colored slip (Figure 24,G), while the remainder are painted in red on the unslipped bowl surface. Two examples have orange paste, one is buff, and one is brown in color. The red on cream sherd is decorated on the exterior; a support fragment (Figure 24,H) is painted both inside and out, while the remaining two examples have interior decoration only. In addition to the outcurving red on cream rim (Form 308), one warped rim of indeterminate form is also included in this class.

The closest parallel to these decorated sherds appears to be the Macana Red-on-Brown type from Tollan-phase Tula (Cobean 1978:412ff). The red semicircle below the exterior rim shown in Figure 24,G is characteristic of Macana Red-on-Brown, although it is found only on the interior surface

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in the Tula type (Cobean 1978:Plates 147-150). Also, Macana Red-on-Brown bowls are generally conical or hemispherical and not outcurving as in the Xochicalco sherd. Hollow supports, as in Figure 24,H, are also characteristic of Macana Red-on-Brown bowls (Cobean 1978:418). Given the small size of the Red-on-Buff collection from Phase H, however, firm conclusions on the relationship of this material to contemporaneous Toltec ceramics cannot be drawn. It does appear, though, that these four sherds are not members of the Macana Red-on-Brown class, but resemble it more than they do any other recognizable decorated class of Early Postclassic central Mexico.

Fine Orange (C.3; n=1)

One body sherd of undecorated Fine Orange pottery was recovered from unit 17. This distinctive class of Gulf Coast ceramics has a relatively limited distribution in central Mexico during the Epiclassic through Middle Postclassic time range, in contrast to its more extensive distribution in southern and coastal Mesoamerica (see discussions in Cobean 1978:622f; Smith and Heath-Smith 1980:25f). In Morelos, Fine Orange ceramics have been recovered from Xochicalco in Phase G deposits (Noguera 1945:151; Kenneth Hirth, personal communication) and from Tepozteco in connection with the ceramic complex of that name, dating to a Middle Postclassic time frame (Smith n.d.). Given these earlier and later manifestations, the presence of a Fine Orange sherd in the Early Postclassic Phase H deposit is not surprising.

The Tilancingo Ceramic Complex

Quantified deposits dating to the Tilancingo phase include units 9, 11, 12, and 13; a total of 504 sherds were recovered from these levels.

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Descriptive classes for the Tilancingo complex are shown in Table 30.

Cooking Vessels (A)

Comals (A.1; n=7)

There are only seven comal rims from Tilancingo phase deposits, making analysis difficult. As Table 31 shows, both orange and buff paste are represented, and comals tend to be finer and harder in paste than are other forms. There are no significant associations among the four paste dimensions, however, nor between them and the dimensions of surface and form. Tilancingo comals are relatively diverse in their surface finish, with brown slip as the most common mode (Table 32). Only one example is polished, with the majority of the rims exhibiting a burnished surface. Comal forms generally have a large angle of elevation (Table 33), and direct rims are the most common mode of form. The one comal form unique to the Tilancingo complex at Xochicalco is a high rim with a pronounced break angle (Form 432; see Appendix A). This form is characteristic of the Tollan phase comals of Tula (Cobean 1978:Profile 191A) and the contemporaneous Mazapan ceramics of the Basin of Mexico (Blanton and Parsons 1971:289).

Basins (A.2; n=3)

About all that can be said of the three quantified basin sherds from the Tilancingo complex is that they do not exhibit uniformity in the dimensions of paste (Table 31) or surface finish (Table 32). The single rim is of Form 217, with an orange slipped exterior and black slipped interior. Two basin handles are present. Both are loop handles--one is horizontal, the orientation of the other is indeterminate (although it is almost certainly horizontal).

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TABLE 30

DESCRIPTIVE CLASSES FOR THE TILANCINGO CERAMIC COMPLEX

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	A. Cooking Vessels				
A.1	Comal	7	7	-	20
A.2	Basin	3	1	2	2
A.3	Plain Olla	32	28	4	239
	B. Storage/Transport Vessels				
B.1	Plain Olla (see Class A.3)				
B.2	Red-on-Buff Olla	2	-	2	-
B.3	Miscellaneous Decorated Ollas	11	-	11	-
	(Total decorated ollas)	13	-	13	-
	C. Serving Vessels				
C.1	Plain Bowl	33	32	1	72
C.2	Guinda	15	7	8	-
C.3	Graphite Guinda	3	1	2	-
C.4	Morelos-Puebla Black-on-Orange	1	-	1	-
C.5	Toluca Red-on-White	18	10	8	-
C.6	Toluca Black-on-Red	3	2	1	-
C.7	Wavy Line Red-on-Cream	16	7	9	-
C.8	Red-on-Buff	5	-	5	-
C.9	Eroded Decorated Bowls	2	2	-	-
	(Total decorated bowls)	63	29	34	-

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TABLE 30 (continued)

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	D. Special Purpose Vessels and Other Ceramic Artifacts				
D.1	Texcoco Fabric Marked	-	-	-	4
D.2	Sahumador	-	-	-	5
D.3	Other Incensario	-	-	-	2
D.4	Spindle Whorl	-	-	-	-
	E. Non-Postclassic Sherds				
E.	Non-Postclassic Sherds	-	-	-	9
TOTAL COUNTS (Total sherds: 504)		151	97	54	353

Notes:

[a]This category represents sherds from quantified levels that were sorted and studied in a preliminary fashion, but not subjected to detailed attribute analysis.

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TABLE 31

PLAINWARE PASTE MODES OF THE TILANCINGO COMPLEX

Dimension	Comals		Basins		Ollas		Bowls	
	N	%	N	%	N	%	N	%
Color								
1. Orange	4	57.1	1	33.3	15	46.9	21	63.6
2. Orange-Buff	-	-	-	-	6	18.8	-	-
3. Buff	3	42.9	1	33.3	7	21.9	6	18.2
4. Brown	-	-	-	-	-	-	1	3.0
5. Grey	-	-	-	-	1	3.1	2	6.1
6. Black	-	-	1	33.3	3	9.4	3	9.1
Texture								
1. Very Fine	-	-	-	-	-	-	-	-
2. Fine	3	42.9	1	33.3	1	3.1	3	9.1
3. Medium	3	42.9	-	-	13	40.6	21	63.6
4. Coarse	1	14.3	2	66.7	15	46.9	9	27.3
5. Very Coarse	-	-	-	-	3	9.4	-	-
Hardness								
1. Normal	1	14.3	2	66.7	30	93.8	28	84.8
2. Hard	6	85.7	1	33.3	1	3.1	5	15.2
3. Soft	-	-	-	-	1	3.1	-	-
Oxidation[a]								
1. Complete	1	14.3	-	-	16	55.2	13	43.3
2. Partial	5	71.4	-	-	11	37.9	13	43.3
3. Slight	1	14.3	2	100.0	2	6.9	4	13.3
Number of sherds	7		3		32		33	

Note: [a]Sherds with black paste are not included in the counts for the oxidation dimension.

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TABLE 32

PLAINWARE SLIP MODES OF THE TILANCINGO COMPLEX

Form Class	Slip Category	Rims + Appendages		Total Sherds[a]		Surface Treatment Index		
		N	%	N	%	Composite[b]	Int.	Ext.
COMAL	(total)	7	-	27	-			
	non-eroded	7	100.0	27	100.0	5.1		
1.	unslipped	2	28.6	7	25.9	4.0		
2.	orange slip	1	14.3	2	7.4	5.0		
3.	brown slip	3	42.3	10	37.0	6.0		
4.	black slip	1	14.3	5	18.5	5.0		
5.	streaky black slip	-	-	3	11.1	-		
BASIN	(total)	3	-	5	-			
	non-eroded	3	100.0	5	100.0	4.5	6.0	3.0
1.	orange slip	2	66.7	4	80.0	5.0	6.5	2.0
2.	black interior	1	33.3	1	20.0	3.5	5.0	5.0
OLLA	(total)	32	-	271	-			
	non-eroded	31	100.0	271	100.0	4.6		
1.	unslipped	17	54.8	109	40.2	3.2		
2.	orange slip	3	9.7	29	10.7	6.0		
3.	brown slip	8	25.8	81	29.9	7.3		
4.	black slip	-	-	5	1.8	-		
5.	black smudge	2	6.5	37	13.7	5.0		
6.	white slip	1	3.2	10	3.7	2.0		

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TABLE 32 (continued)

Form Class	Slip Category	Rims + Appendages		Total Sherds[a]		Surface Treatment Index		
		N	%	N	%	Composite[b]	Int.	Ext.
BOWL	(total)	33	-		-			
	non-eroded	32	100.0	105	100.0	6.3	6.9	5.8
1.	unslipped	2	6.3	6	5.7	4.8	5.0	4.5
2.	orange slip	12	37.5	33	31.4	5.8	6.3	5.3
3.	brown slip	14	43.8	46	43.8	7.1	7.5	6.6
4.	black slip (interior)	3	9.4	19	18.1	6.5	7.3	5.7
5.	white slip	1	3.1	1	1.0	6.5	8.0	5.0

Notes:

[a]Total sherds includes body sherds not subjected to attribute analysis in addition to the rims and appendages.

[b]The composite surface treatment index is the average of the interior and exterior values (for the bowls and basins).

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TABLE 33

COMAL FORMS AND FORM SUBCLASSES OF THE TILANCINGO COMPLEX

Subclass	N	%	Constituent Forms
I. COMAL ELEVATION	(7)[a]	100.0	
1. flat	-	-	
2.	1	14.3	405(1)[b]
3.	5	71.4	406(2) 439(2) 448(1)
4. high	1	14.3	432(1)
Elevation index (mean): 3.00			
II. COMAL FORM	(4)[a]	100.0	
5. sharp break angle	1	25.0	432
6. direct rim	3	75.0	439(2) 448

Notes:

[a]Number of rims scored on each variable. There are more rims scored on the elevation variable because rim fragments could often be oriented to provide the elevation angle, although they could not be assigned to a more definite form subclass.

[b]Figures in parentheses represent the number of each form present; underlined forms are unique to the Tilancingo complex.

Plain Ollas (A.3; n=32)

Paste.--Ollas have the coarsest paste of the four form classes (Table 31). Orange paste predominates over the buff variety, and there is a tendency for the orange paste to be somewhat coarser than the buff paste (chi square = 3.73 with 2df; significance = .166). Ollas are relatively well fired, with a larger percentage of examples with complete oxidation than the other form classes. There is a slight tendency for the buff sherds to be more highly oxidized than the orange sherds, a reversal of the general firing pattern of the two pastes. Paste variables are not significantly associated with those of surface or form.

Surface.--Presence or absence of slip on olla surfaces was more difficult to determine for the Tilancingo and Temazcalli complexes than for the other Postclassic complexes of Morelos. Rim sherds, which were always examined carefully along a fresh break, were less difficult to categorize; however the classification of olla body sherds presented difficulties and the material was sorted several times by myself and another archaeologist. The main problem was to distinguish between unslipped and brown slipped surfaces; therefore, the figures for relative slip frequencies are less certain for ollas than for other forms. Nevertheless, analysis of the olla rims and appendages suggests that the final slip classification of olla bodies is not too inaccurate. First, paste color is not associated in any consistent manner with surface finish. Therefore, the possibility that differences in paste color were mistakenly taken for differences in slips may be regarded as small. Secondly and more important, the percentages of finish modes of the rims (based upon closer examination of each sherd) closely matches the percentages of the finish modes of the bodies (see

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Table 32); in fact, the counts per finish mode of rims are correlated with the matching counts of bodies at a high level (r = .93). Therefore, in spite of initial problems of sorting olla surfaces in the laboratory, the final classification appears to be relatively accurate.

Unslipped and brown-slipped ollas together comprise over two-thirds of the plain ollas of the Tilancingo complex (Table 32). As the surface treatment index shows, olla finish and treatment are associated, with the unslipped examples exhibiting less treatment than the slipped examples. This association, as well as the relationship between surface finish and attributes of olla form are discussed below.

Form.--All but three of the twenty-eight olla rims from this phase are fragmentary and unassignable to specific forms. Two could not be oriented (Form 100), while twenty-three were assigned to Forms 104-107 (see Table 34). The one form unique to the Tilancingo complex (110) is illustrated in Figure 25,A and represents the only form that could be scored on the olla neck height scale; it has a restricted neck, and exhibits a slipped surface. An unslipped olla with a larger diameter is also illustrated for comparison (Figure 25,B); two wedge-rimmed ollas (Form 133) are also present in this complex.

Discussion.--If the plain ollas are divided into an unslipped and a slipped category, several relationships are revealed which, although not conclusive, do support the hypotheses concerning olla function discussed above. The relevant data are presented in Table 35. First, slipped ollas tend to be far more highly polished than unslipped ollas. This makes sense in terms of the postulated division of ollas into functional categories based upon surface attributes; cooking vessels should exhibit less investment in

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TABLE 34

PLAIN OLLA FORMS AND FORM SUBCLASSES OF THE TILANCINGO COMPLEX

Subclass	N	%	Constituent forms
I. OLLA RIM CURVATURE	(24)		
1. vertical	1	4.2	110(1)
2.	2	15.4	107(2)
3. moderate	11	20.0	106(11)
4.	9	15.0	105(9)
5. maximum curvature	1	4.5	104(1)
- other forms	4	-	100(2) 133(2)
Curvature index (mean): 3.29			

II. OLLA RIM DIAMETER

8	9	10	11	12	13	14
X X					X	X

TABLE 35

OLLA FUNCTIONAL MODES OF THE TILANCINGO COMPLEX

Modes	Unslipped	Slipped
SURFACE TREATMENT		
2. smoothed	9	1
3. partially burnished	2	-
5. burnished	6	6
8. polished	-	7
Surface Treatment Index	3.2	6.3
HANDLES		
1. horizontal loop	1	-
2. vertical loop	-	1
3. indeterminate loop	1	1
RIM DIAMETER		
1. 8 cm	-	2
2. 13 cm	-	1
3. 14 cm	1	-
Mean Diameter	14.0	9.7

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Figure 25. Ceramics of the Tilancingo Complex. A, slipped olla (11-2, 110); B, unslipped olla (11-4, 106); C, Red-on-White olla (11-30); D, brown slipped bowl (9-15, 315V); E-N, Toluca Red-on-White bowls, E (9-59, 319), F (9-55, 319), G (9-56, 319), H (9-57, 319), I (9-58, 319), J (12-17, 362), K (9-63, 319), L (11-36, 319), M (11-35, 322), N (black on white decoration; 9-65, 306).

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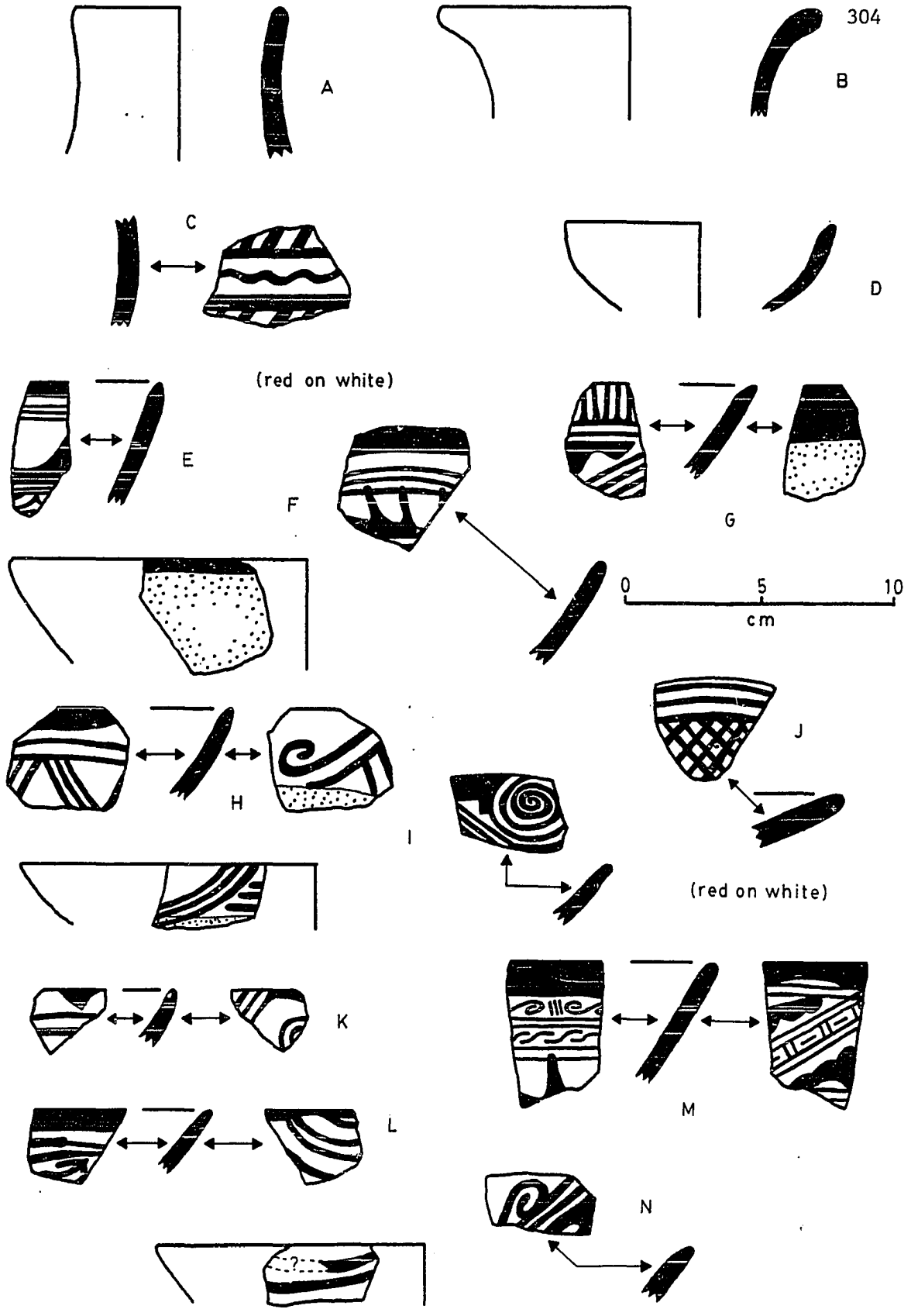

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finishing (i.e. unslipped) and treatment (i.e. smoothed but not heavily polished) than storage or carrying vessels. However, olla function alone cannot account for all examples of this association between surface finish and surface treatment; it is also present in the other form classes, albeit to a lesser degree (Table 31). Unslipped surfaces in general are not highly polished. Nevertheless, the difference in treatment between unslipped and slipped ollas (mean index difference of 3.1) is much greater than the corresponding difference for comals (1.6) and bowls (1.6). The predicted functional distinction is also supported by the meager available data on olla handles and rim diameters (Table 35). The only horizontal handle is on an unslipped olla, while the only definitely vertical handle is from a slipped example; similarly, the slipped ollas have smaller rim diameters than does the single unslipped olla with a measurable diameter. Thus, in spite of the small number of ollas and the very few handle and diameter measurements available, all indications support the division of ollas into cooking (unslipped) and storage/carrying (slipped vessels in the Tilancingo complex.

Storage/Transport Vessels (B)

Plain Ollas (B.1; n=32)

See discussion under class A.3 above.

Red-on-Buff Ollas (B.2; n=2)

This is a category containing only two fragmentary body sherds. One has coarse orange paste, with a burnished exterior; the other is partially oxidized, buff paste, with a polished exterior. The decoration is fragmentary, and it is not known if these sherds were locally made or imported. It may be significant, however, that the parallel red lines

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visible on one of the sherds are characteristic of red on buff (Type A) ollas from the Postclassic Toluca Valley (Tommasi 1978:plates 31-32).

Miscellaneous Decorated Ollas (B.3; n=11)

This category consists of two black on white and nine red on white body sherds, all of which are too fragmentary or eroded to be firmly classified. The black on white sherds are burnished, with a medium texture, buff paste, and are most likely Taxco Black-on-White ollas. The red on white sherds vary in paste (two orange, four buff, one grey, and two black) and surface treatment (six burnished, three polished). Only one of the sherds is large enough to infer the decorative design (see Figure 25,C) which resembles some of the Toluca Valley red on buff ollas (Type A; see Tommasi 1978:Lâmina 32). While none of the polished examples of red on white ollas from the Toluca Valley have this sort of decoration (Tommasi 1979: plates 35 and 36), the paucity of Tlahuica Polychrome ollas in the Tilancingo complex suggests that this material represents imports from the Toluca area (see discussion of the Toluca Postclassic chronology in Chapter 7).

Serving Vessels (C)

Plain Bowls (C.1; n=33)

Paste.--Orange paste is almost four times as common as buff paste and, again, tends to be better oxidized. Medium texture is predominant. Paste attributes are not consistently associated with attributes of other dimensions.

Surface.--Only nine of the twenty-two combinations of interior and exterior bowl surface finish found in the Postclassic ceramics of Xochicalco occur in the Tilancingo complex. The nine categories are grouped into five

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slip modes (Table 36); the frequencies of the modes are given in Table 32. The slip modes were defined as follows: First, computer printouts were generated to show the score of each of the nine categories on a number of different dimensions (surface treatment, paste, form). Categories which intuitively appeared similar were compared on the basis of their scores, and if they exhibited similar variation, they were grouped together as a slip mode. New printouts were then made using the five modes in place of the nine original categories; these modes form the basis of all subsequent analyses of surface finish. Orange and brown slip modes together comprise over three-fourths of all the plain bowls. Most slipped bowls are relatively well polished or burnished as compared with other form classes; unslipped bowls received less surface treatment. In general, interiors are more highly polished than exteriors (Table 32).

Form.--Hemispherical bowls account for eighty-five percent of plain bowls that could be assigned to a form (Table 37). The occurrence of plain bowls with Form 327 is unusual, as this form otherwise is limited to decorated bowls of the Wavy Line Red-on-Cream type. Diameter measurements were possible for only two bowls. One of Form 305 measures twenty centimeters; the other, a variant of Form 315, measures ten centimeters (see Figure 25,D). One hollow support fragment is included with plain bowls, although the exterior of this piece is so eroded that it is impossible to tell if it was originally plain or decorated.

Guinda (C.2; n=15)

Definition.--The term Guinda (first proposed by DuSolier 1949:35) is used here to designate the distinctive highly-polished red ceramics that are characteristic of a number of Postclassic ceramic complexes in central

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TABLE 36

SURFACE FINISH MODES OF TILANCINGO PLAIN BOWLS

Interior \ Exterior	No Slip	Or.	Brn.	Blk.	Mott. Brn.	Smudge	White	Other	TOTAL
Unslipped	2/6[a]								
Orange	1/2	11/31	1/6						
Brown			13/40						
Black		1/9	1/9	1/1					
Streaky Black									
Mottled Brown									
Smudged Black									
White							1/1		
Other									
TOTAL									32/105

[a]Entries list counts of rims and body sherds, separated by a slash.

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TABLE 37

PLAIN BOWL FORMS AND FORM SUBCLASSES OF THE TILANCINGO COMPLEX

Subclass	N	%	Constituent forms
2. Incurved	1	3.7	310(1)
3. Hemispherical	23	85.2	315(23)
4. Conical	2	7.4	319(2)
6. Everted	1	3.7	327(1)
Total non-fragmentary:	27		
Total fragmentary:	5		300(1) 304(1) 305(2) 306(1)
Total plain bowl rims:	32		

Mexico. Guinda is found in significant quantities not only in the Basin of Mexico, but also in Morelos, Puebla, and possibly the Toluca Valley. These ceramics are often painted with black and/or white, and occasionally orange designs, which archaeologists have used to define types (e.g. "Texcoco Black on Red," "Black and White on Red" or "Aztec Polychrome," "White on Red" and so forth; see, for example, Tolstoy 1958:45). Parsons (1966:226) points out that these distinctions are somewhat arbitrary and have not been found to be chronologically, spatially, or culturally significant. Accordingly, all of these redware types are considered together here under the neutral label "Guinda."

In the Postclassic sequence at Xochicalco, Guinda ceramics are present in all four complexes, and comprise the most abundant decorative class in two of them (Temazcalli and Early Cuauhnáhuac). They are also very common in the Teopanzolco and Tetla complexes and in the Cuauhnáhuac phase occupation of Cuernavaca; they are rare in the Tepozteco complex. Petrographic analysis of Morelos sherds, including several examples suspected to originate in the Basin of Mexico, proved inconclusive; therefore, we cannot be certain of their place of origin. My suspicion is that most of the Morelos examples were locally made, with a few sherds from Basin of Mexico vessels at some sites. A thorough study of the Guinda ceramics of the whole central Mexican highlands is required before firmer conclusions can be drawn. The most distinctive variant of central Mexican Guinda that can presently be isolated is the Graphite Guinda type discussed below; my category "Guinda" includes all Postclassic polished redwares <u>not</u> assignable to this variant. The primary definitional criterion is a lustrous red finish on one or both surfaces. Fifteen sherds came from quantified

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levels, in addition, several other Guinda sherds were recovered from the mixed Phase G/Tilancingo deposits in Pit D2.

Paste.--Buff paste predominates in the Guinda ceramics, and most sherds have a grey core indicating incomplete oxidation (Table 38); this grey core is characteristic of the Guinda paste in all periods, and relates to the firing atmosphere required for the highly polished surfaces (Shepard 1956:124). Five sherds exhibit a fine, not fully oxidized buff paste that is characteristic of much of the Guinda class found in western Morelos throughout the Postclassic period. Whereas six of the eight buff sherds have a fine texture, all five orange paste sherds have a medium texture. A distinction between orange and buff pastes within the Tilancingo Guinda ceramics is further supported by the fact that they are mutually exclusive with respect to vessel form. Buff rims are of Forms 315 and 332 only, while orange rims are found only in Forms 316 and 369.

Surface.--The red surfaces of Guinda vessels are almost always polished to a high luster (only thirteen percent of red surfaces were burnished). All of the Tilancingo Guinda sherds have red interiors; seven are red only, five have black on red painting, and three are smudged over the red in either the characteristic "grey smudge" or else a black smudge finish. Thirteen of the fifteen sherds have unpainted exteriors; however, five of the thirteen have red bands about one centimeter wide circling the vessel immediately below the rim. The unpainted portions of the vessel exteriors range from smoothed to polished in surface treatment. Both of the examples with red exteriors are decorated; one with black, and the other with black and white designs. These surface variations are not correlated with paste color. Unfortunately, sherd fragments are too small to yield

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TABLE 38

PASTE MODES OF SELECTED TILANCINGO DECORATIVE CLASSES

Dimension	Guinda		Toluca Red-on-White[a]		Wavy Line Red-on-Cream[a]	
	N	%	N	%	N	%
Color						
Orange	5	33.3	12	27.3	3	13.0
Orange-Buff	1	6.7	1	2.3	2	8.7
Buff	8	53.3	21	47.7	15	65.2
Brown	-	-	2	4.5	-	-
Grey	-	-	2	4.5	3	13.0
Black	1	6.7	6	13.6	-	-
Texture						
Fine	6	40.0	18	40.9	3	13.0
Medium	9	60.0	24	54.5	15	65.2
Coarse	-	-	2	4.5	5	21.7
Oxidation[b]						
Complete	3	21.4	19	50.0	14	60.9
Partial	7	50.0	11	28.9	7	30.4
Slight	4	28.6	8	21.1	2	8.7
Number of sherds	15		44		23	

Notes:

[a]Counts for these classes include sherds from both Temazcalli and Tilancingo deposits.

[b]Sherds with black paste are not included in the counts for the oxidation dimension.

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information on the nature of any of the designs.

Form.--As noted above, paste color and vessel form are associated within the Tilancingo Guinda type. Buff paste comes in either simple hemispherical (315; n=2) or slightly recurved, but still hemispherical forms (332; n=1). Orange paste rims are either an internally thickened hemispherical form (316; n=3), or a rare plato form (369; n=1). These forms are not associated with surface attributes, and no diameter measurements are available. None of the Guinda sherds are illustrated because of small size.

Discussion.--Given the small quantity and fragmentary nature of the Guinda material, it is difficult to make detailed comparisons with other ceramic assemblages. All fifteen sherds are clearly within the Guinda tradition found elsewhere in the highlands during the Middle and Late Postclassic periods. The Tilancingo examples mark the inception of this class in western Morelos, and the presence of both regular Guinda and Graphite Guinda in the Tilancingo deposits suggests that they may have a common or similar place and time of origin.

Graphite Guinda (C.3; n=3)

This type appears primarily in the Temazcalli complex. Because of the small number of sherds from Tilancingo levels and their similarity to later examples, all of the Graphite Guinda sherds are discussed together under the Temazcalli complex.

Morelos-Puebla Black-on-Orange (C.4; n=1)

See discussion under the Temazcalli complex.

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Toluca Red-on-White (C.5; n=18)

Definition.--This decorative type includes all bowls painted in red designs on a white background whose motifs and stylistic conventions are identical or very similar to red on white bowls manufactured in the Toluca Valley during the Postclassic epoch (see Tommasi 1978; García Payón 1941; and Vargas 1975); none of these examples can be confused with the later Tlahuica Polychrome Bowls of Morelos. Several sherds exhibiting black on white decoration in the same style are also included in this class. The following description is based upon all sherds of this type recovered at Xochicalco; these include twenty-six examples from quantified Temazcalli contexts plus several other examples from unquantified deposits of that phase. Some differences between the Tilancingo and Temazcalli samples were noted in vessel form and decoration. The possible significance, if any, of these differences is not known at the present time because of the lack of chronological control in the Postclassic ceramics of the Toluca Valley. For this reason, differences between the two samples are noted below in the appropriate section.

Paste.--Buff paste predominates over orange paste at nearly a two to one ratio, and most paste textures are medium or fine (Table 38). Half of the sherds are fully oxidized, and there is a slight tendency for the orange paste to be better oxidized than the buff variety. One sherd of this type (from a Tilancingo deposit) was subjected to petrographic analysis. The temper and clay materials were not appreciably different from the local Morelos sherds analyzed, and it is classified in Paste Group 3 (Basalt-andesite and quartzite, with carbonates; Cyphers 1982).

Surface.--Five of the sherds in this type are painted in black designs on a white background (two from the Tilancingo phase and three

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from the Temazcalli phase). Two of these sherds are decorated on the interior surface only, with unslipped exteriors, while three sherds are decorated on both sides. Surface treatment on these examples includes both burnished and polished surfaces. In the remaining examples of Toluca Red-on-White, nearly all sherds are decorated on the interior surface, while only 60% are decorated on the exterior. The undecorated areas are unslipped, and their treatment ranges from smoothed to polished. All of the interior painted surfaces are polished, while most but not all of the exterior painted areas are polished.

Decoration.--Although none of the sherds of the Toluca Red-on-White are large enough to reconstruct the entire interior or exterior decorative fields, certain diagnostic motifs and patterns are visible. The best examples of decoration are illustrated in Figure 25,F-N (Tilancingo phase) and Figure 26,A-E (Temazcalli phase). Most of the sherds with interior decoration have a red rim-band; one (Figure 25,K) has triangular rim motifs. Below the rim decoration, horizontal parallel lines are usually found. Below these lines, only fragments of the decorative field are visible; diagonal lines are found on several sherds. Some of the painting is precise and well-executed (e.g. Figure 25,M) while other examples have thicker, sloppier lines (e.g. Figure 25,L). On the exterior surface, only three Tilancingo sherds appear to have large decorative fields that cover all or most of the vessel wall.

The most common exterior decorative pattern consists of a painted band immediately below the rim. Two rims have a narrow (ca. 0.5 cm) red band, while nine examples have a two to three centimeter wide white band on which red designs are painted. The red concentric semicircles or segments

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Figure 26. Ceramics of the Tilancingo and Temazcalli Complexes. A-E, Toluca Red-on-White of the Temazcalli Phase, A (8-179, 319), B (8-176, 315), C (207-1, 362), D (207-2, 336), E (20-43, 319); F-G, Toluca Black-on-Red of the Tilancingo Phase, F (9-68, 325), G (9-67, 328).

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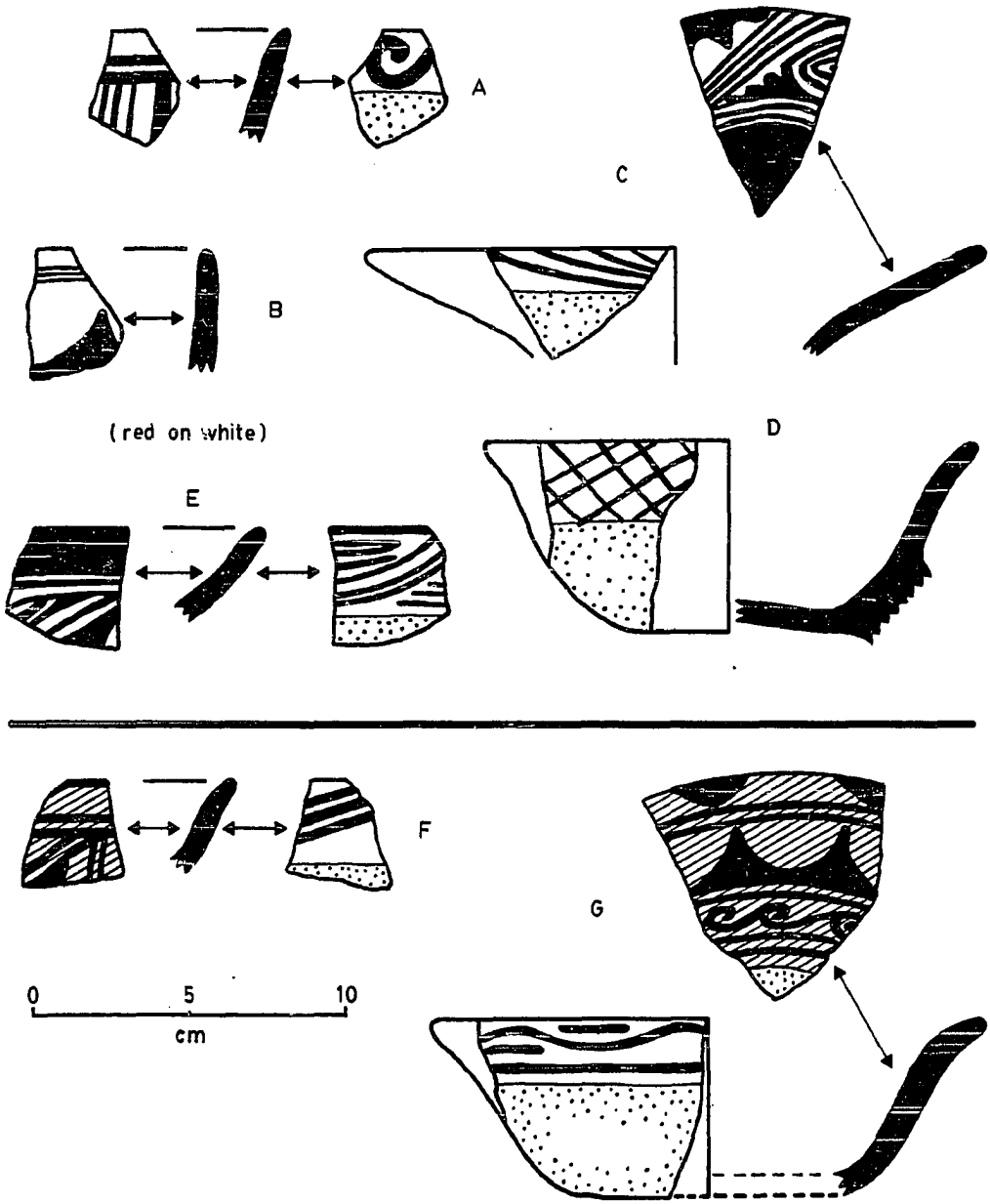

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shown in Figures 25,I,L and 26,C,E represent perhaps the most common exterior decorative motif in the Postclassic ceramics of the Toluca Valley (see Tommasi 1978). Two rims have no exterior painting at all; body sherds that lack exterior paint may match either this pattern or the more common exterior rim-band pattern. Most of the decorative motifs visible on these sherds may be found in published examples of Toluca Valley decorated vessels (Tommasi 1978; García Payón 1941); those not present in the publications are well within the stylistic conventions of Postclassic Toluca Valley ceramics. The two vessels illustrated in Figure 26,C and D are from an unquantified Temazcalli phase deposit (catalog number X-207). The second of these is quite eroded and has an unusual form; it is not clear whether or not it pertains to this type.

Form.--While most of the Toluca Red-on-White rims represent simple hemispherical or conical bowls, there are some differences between the ranges of form in the Tilancingo and Temazcalli phase examples. Of the ten rims from the former complex, two are fragments (306), six are conical (319), one straight-walled (322; see Figure 25,M), and one is a plato (362; Figure 25,J); there are no hemispherical forms present. In the Temazcalli phase, on the other hand, hemispherical bowls are the most common form with five examples (315); also present are three conical bowls (319) and three fragmentary rims (301:1; 305:2). In addition, a recurved form (336) and a plato (362) are represented in unquantified Temazcalli contexts (see Figure 26,D and C). Three diameter measurements are available for the Tilancingo examples. One black-on-white rim of uncertain form (306) has a diameter of twenty centimeters, while two conical bowls each have twenty-two centimeter diameters. The only support present is the broken end shown in Figure 26,D;

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however, most of the Toluca Valley examples of this type have tripod supports (Tommasi 1978: Lámina 35; García Payón 1941: Lámina 4). The lack of supports in the Xochicalco material is probably due to the small sample size and accidents of recovery.

Discussion.--Tommasi (1978:107-113) has published a three-type classification of Postclassic decorated funerary vessels from the site of Teotenango in the Toluca Valley. Her Type A consists of vessels with red-on-buff decoration; Type B encompasses red on white, black on white, and polychrome (black and red on white) painting; and Type C corresponds to black and/or white on a red or Guinda base (the relationship of this latter to the Morelos and Basin of Mexico Guinda is uncertain). In this broad typology, the Toluca Red-on-White sherds from Tilancingo and Temazcalli deposits at Xochicalco correspond to Tommasi's Type B. They appear to fit in with any or most of García Payón's poorly illustrated ceramic groups, Matlatzinca II, III, or IV (García Payón 1941; 1956/57). In Vargas' (1975) classification of the Teotenango vessels, the Xochicalco sherds appear to correspond to "Rojo sobre Blanco Cremoso" (1975:250f), much of which is actually black and red on white. The confused Postclassic chronology of the Toluca Valley is discussed in detail in Chapter 7; none of the published work of the above three authors provides sufficient information to establish even a rough chronological sequence for the Postclassic ceramics of that area.

Possibly, a more productive comparison for the Toluca Red-on-White ceramics can be made with the ceramics excavated by Galván (1974/75) in the town of Santa Maria Malinalco. On the basis of several test pits, Galván established a ceramic sequence dating from the Late Formative period to the

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Early Colonial period. His phases five through seven cover the Postclassic period, and appear to correspond generally to the Early, Middle, and Late Postclassic periods as used in this work (I disagree with his dating of the three phases at A.D. 900-1300; A.D. 1300-1450; A.D. 1450-1519; see my discussion in Chapter 7). Toluca Valley tradwares similar to the Morelos examples (called "Negro y Guinda sobre Blanco"--Galván 1974/75:66f) are attributed by Galván to phase 5, but an examination of his tables of counts per level (Cuadros I and II) shows that this ware is a major component of both phases 5 and 6 (Early and Middle Postclassic), but not phase 7 (Late Postclassic). This agrees with the occurrence of the Toluca decorated wares in the Tilancingo and Temazcalli phases at Xochicalco, although they appear to start earlier at Malinalco.

Toluca Black-on-Red (C.6; n=3)

The material in this class is presumed to have been imported from the Toluca Valley and is characterized by black on red interior decoration and red and/or black on white exterior decoration. All three examples have fine, partially oxidized paste: two are orange, one is buff. The two illustrated rims (Figure 26,F,G) both have burnished black on red interiors, while the remaining body has a polished red interior. The only exterior decoration on the rims are burnished, black on white rim bands, while the body has a red on white exterior surface. The two forms represented--325 and 328--are somewhat unusual compared to the local Morelos ceramics.

Discussion.--These three sherds are designated as imports from the Toluca Valley because that is the only area of Postclassic central Mexico that has yielded ceramics with black on red interiors and black and/or red on white exteriors. This kind of decoration most commonly consists of

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solid black circles on the red interior, and a black and/or red on white exterior rim-band. It is found on tripod supported, shallow platos (Tommasi 1978: Lámina 34). The body sherd of Toluca Black-on-Red from Xochicalco appears to be from such a vessel, but the two illustrated rims clearly are not. The interior designs on the rims are more complex (though within the general Toluca style). While one exterior motif consists of the common Toluca semicircles, the other is somewhat distinct and resembles Tlahuica designs from Teopanzolco more that "Matlatzinca" designs from the Toluca Valley. As such, these two rims diverge from the most common Toluca Valley ceramics of the same colors, and their identification is not as secure as that of the body sherd. Comparative ceramics from the Toluca Valley are also included in Tommasi's Type B; Vargas calls them "Negro y blanco sobre rojo" (1975:259), and García Payón has them in his Matlatzinca III and IV groups (1941; 1956/57). These ceramics appear to be the type designated "Interior rojo pulido" by Galván (1974/75:70), which is found in phases 5 and 6 at Malinalco.

Wavy Line Red-on-Cream (C.7; n=16)

Definition.--This type consists of bichrome bowls decorated with wavy-line and other motifs. Most examples have red designs on a cream or white slip, although some are painted in red (occasionally brown or black) directly on the unslipped buff surface of the vessel. Because the slipped and unslipped examples do not differ in other respects (and it is sometimes difficult to determine the presence or absence of a slip), all of these sherds are considered as a single decorative type. The following description is based upon all sherds of this type recovered at Xochicalco; these include fifteen examples from Temazcalli deposits as well as the sixteen from

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Tilancingo levels. Four sherds from each phase consist of molcajete or grater-bottom bases with traces of red on cream decoration. While the presence of the wavy-line motif cannot be positively determined on these sherds, they are included here because this is the only red on cream class that exhibited molcajete incisions. Through an oversight in the laboratory analysis, attributes were not recorded on these eight molcajete bases (drawings were made); for this reason, they do not enter into the category totals in the quantified descriptions below. Differences between the Tilancingo and Temazcalli examples of Wavy Line Red-on-Cream are noted where appropriate. In addition to the thirty-nine sherds described here, several others were recovered from unquantified levels in Pit D2 that date to either the Tilancingo or Temazcalli phases.

Paste.--The dominant phase is a medium textured, buff paste (Table 38). Only three sherds have orange paste, none are black. Oxidation is variable, but more than half of the examples are completely oxidized. Most of the unquantified sherds have medium buff paste as well.

Surface.--Of the twenty examples with non-eroded surfaces, half have red on cream decoration both inside and outside; one has a cream slip interior and a red on cream exterior. Eight sherds have red on buff interiors and variable exterior (four red on buff; one cream slip; one black on buff; two unslipped). One sherd from Temazcalli deposits is painted in red on orange, both interior and exterior; it is not clear if the orange is a slip or just the natural surface of the orange paste. Most of the red on cream slip surfaces are polished, while most of the red on buff surfaces are burnished; unslipped surfaces are smoothed.

Decoration.--As per the type label, the dominant decorative motif

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consists of wavy or undulating lines. Most examples have relatively thin lines, either adjacent to one another or separated by a straight line; wide painted lines are less common. Examples of Wavy Line Red-on-Cream sherds from Tilancingo levels are shown in Figure 27,A-F, and sherds from Temazcalli deposits in Figure 27,G-J. In all cases where all or most of the vessel wall is present, the decorative field covers the entire interior and/or exterior surface. Designs are usually similar on the interior and exterior of a given vessel. Rim decoration is common. Interiors often have triangles (Figure 27,A,H) or else "fringe" rim decoration (Figure 27,B,J), while most sherds have a narrow rim-band on the exterior surface. The vessel shown in Figure 27,C is unusual in that the interior design is crudely outlined with deep incision; one other fragment has traces of incising on the interior vessel wall. No obvious differences in decoration between the Tilancingo and Temazcalli examples of this type have been isolated.

Two clear examples of Wavy Line Red-on-Cream are molcajetes with deeply incised interior bases (e.g. Figure 27,D). Four additional molcajete bases show traces of red on cream decoration on the vessel walls; the painted area is not large enough to determine the designs, but the visible design fragments are consistent with the wavy-line style (see Figure 27,I). The Tilancingo and Temazcalli incision patterns show a difference which may or may not be significant. The Tilancingo examples (Figure 27,D,F) have straight incised lines, while several Temazcalli sherds (Figure 27,I) have alternating straight and wavy incisions. Two Wavy Line Red-on-Cream sherds with part of the interior bases intact do <u>not</u> have incisions. On the bases of the small number of available sherds, it cannot be determined how common the molcajete incision is on vessels of this decorative type. At least some

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Figure 27. Ceramics of the Tilancingo and Temazcalli Complexes. A-F, Wavy-Line Red-on-Cream of the Tilancingo Phase, A (9-52, 327), B (9-54, 327), C (11-32, 326), D (13-13, 326), E (12-18), F (9-00, 327); G-J, Wavy-Line Red-on-Cream of the Temazcalli Phase, G (8-168, 327), H (8-170, 327), I (8-00), J (16-40, 327).

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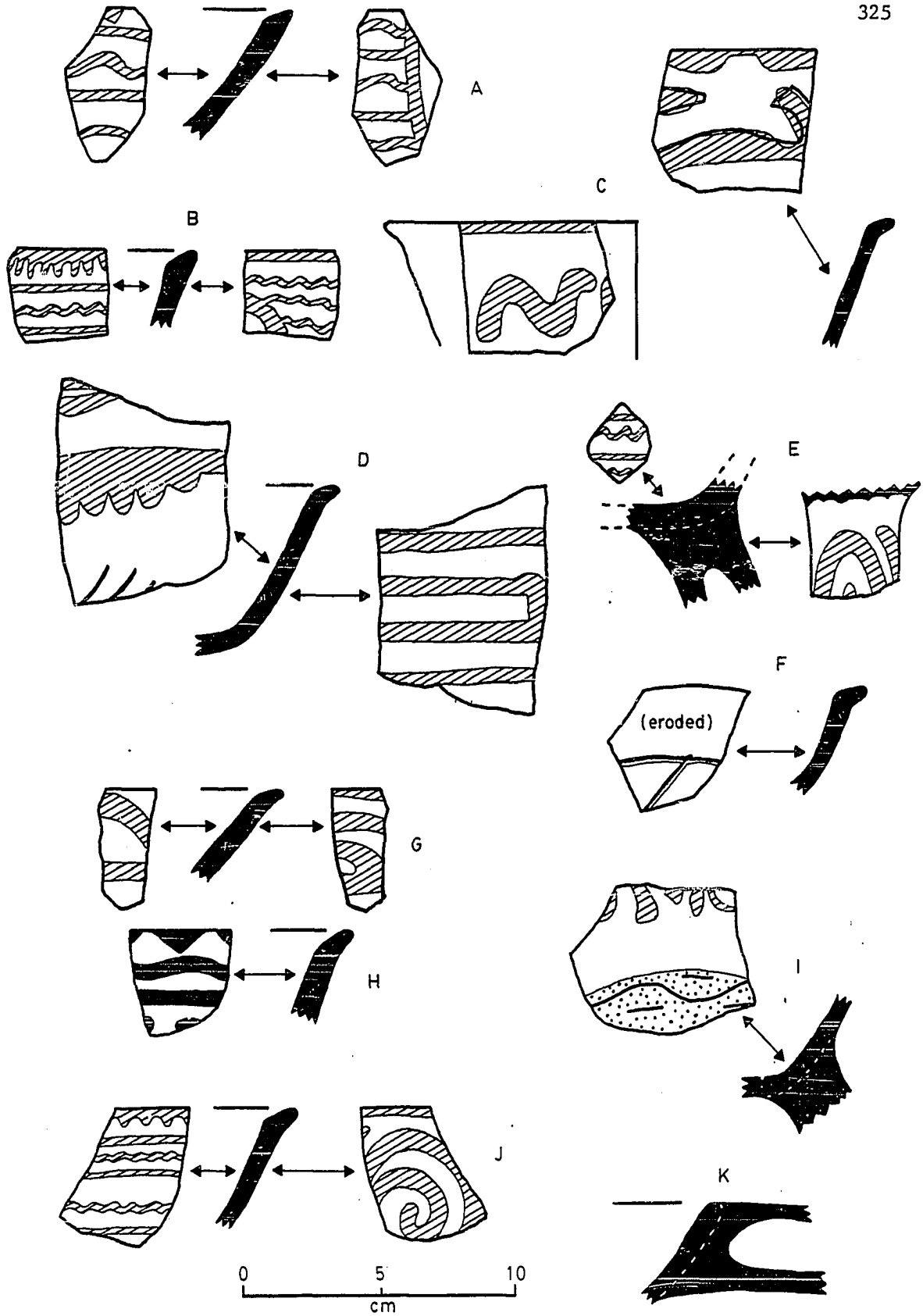

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of the specimens have basal incision and with the exception of later Aztec III molcajetes, no other bowl class exhibits such decoration.

Form.--Fifteen of the seventeen rims of Wavy Line Red-on-Cream are everted; with the exception of a few plain bowls in the Tilancingo and Temazcalli complexes, everted rims at Postclassic Xochicalco are limited to this type. There are some differences between the two complexes in their complements of form. Of the six Tilancingo everted rims, two are of Form 326 (Figure 27,C), and the rest are Form 327; one recurved rim (336) is also represented in the Tilancingo examples. In the Temazcalli data, nine of the ten rims are of Form 327, while one conical form (319) is present. This trend could indicate an increase in the standardization of form, but the small sample size precludes firm conclusions. One diameter of nineteen centimeters is available for Form 326 (Tilancingo complex). Three supports were recovered; one is hollow, two are solid.

Discussion.--No published examples of Wavy Line Red-on-Cream have been located in the literature on central or west Mexican ceramics. A few whole vessels of the type were recovered in the Instituto Nacional de Antropología e Historia (INAH) investigations of the middle Balsas drainage; these are on display in the Museo Nacional de Antropología in Mexico City, but are not included in the ceramic report of that project (Muller 1979). Similar whole vessels, without provenience, are in the collections of the Centro Regional Morelos-Guerrero of INAH in Cuernavaca, Morelos (Figures 28, 29). All of these vessels exhibit the wavy-lined decoration on everted rim bowls with hollow tripod supports; all have the incised molcajete bases as well. It has been suggested that the place of origin of this type is the Taxco area of Guerrero (Raul Arana and Guadalupe Martinez, personal

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Figure 28. Wavy-Line Red-on-Cream vessel of unknown provenience. (Centro Regional Morelos-Guerrero, Instituto Nacional de Antropología e Historia, Palacio de Cortés, Cuernavaca, accession number MSQ-1650.)

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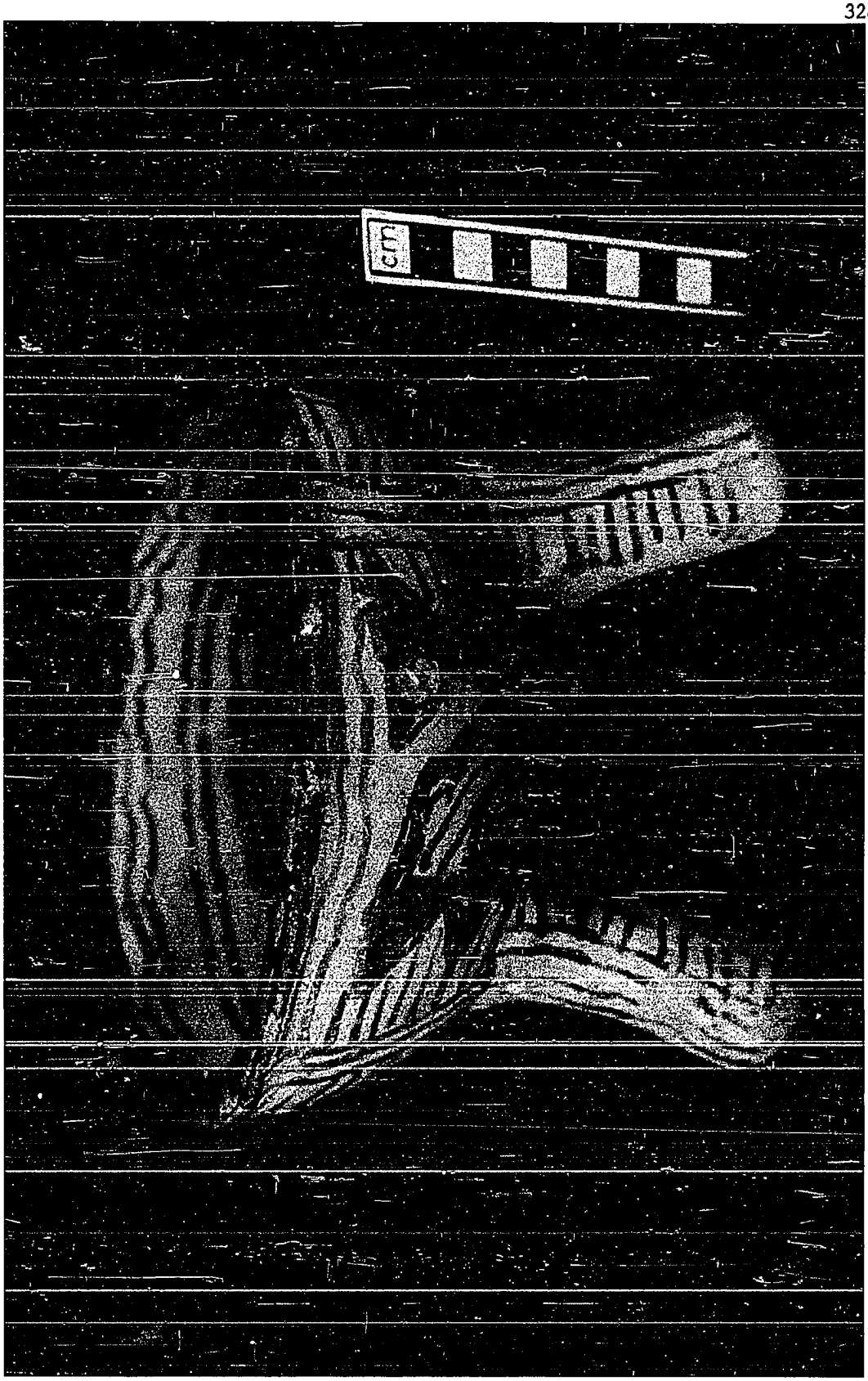

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Figure 29. Wavy-Line Red-on-Cream vessel of unknown provenience. Same vessel as shown in Figure 28.

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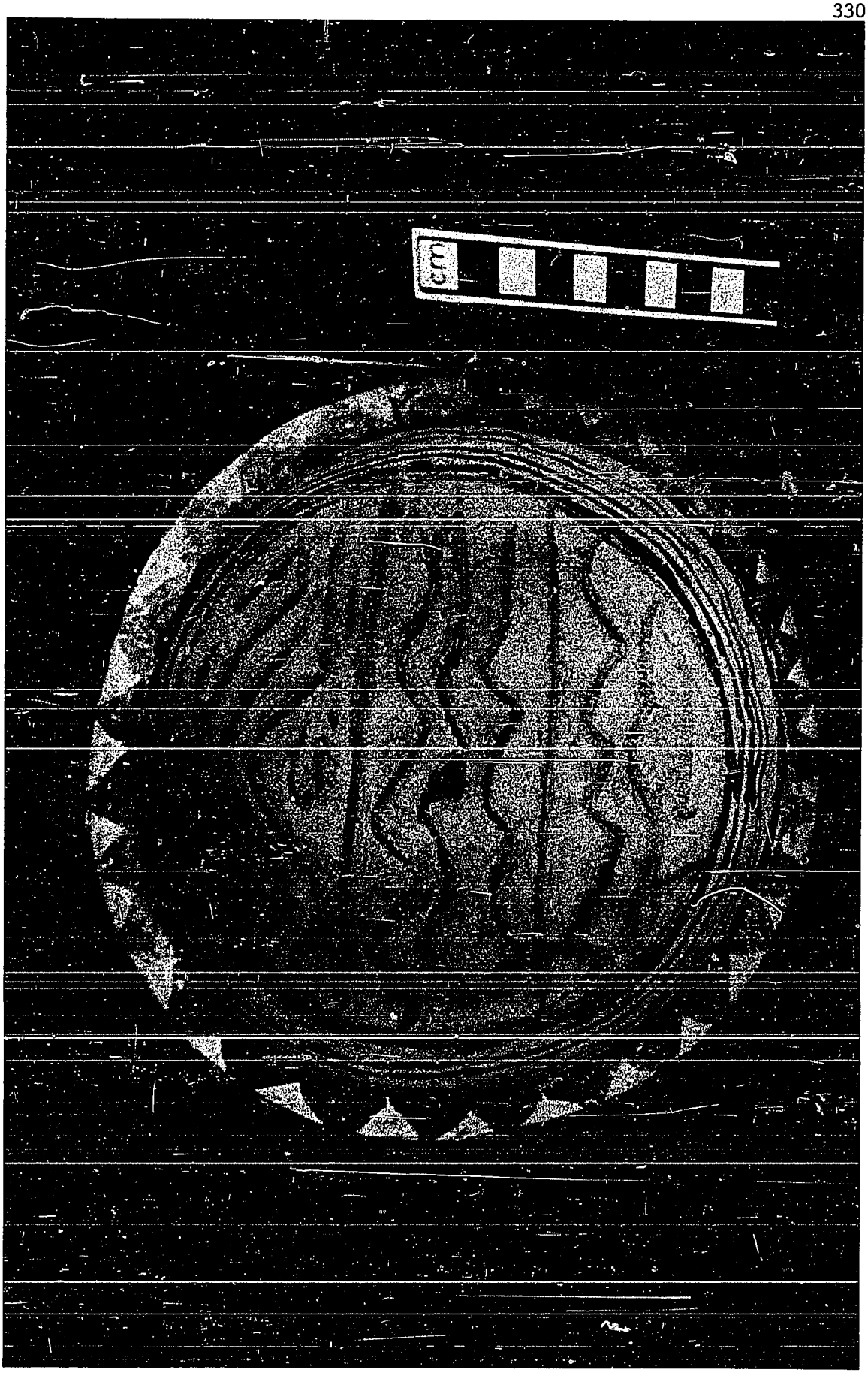

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Figure 30. Wavy-Line Red-on-Cream sherds from southwestern Morelos. Sherds are from surface collections at various sites located by the Rio Chalma survey, Kenneth G. Hirth, Director.

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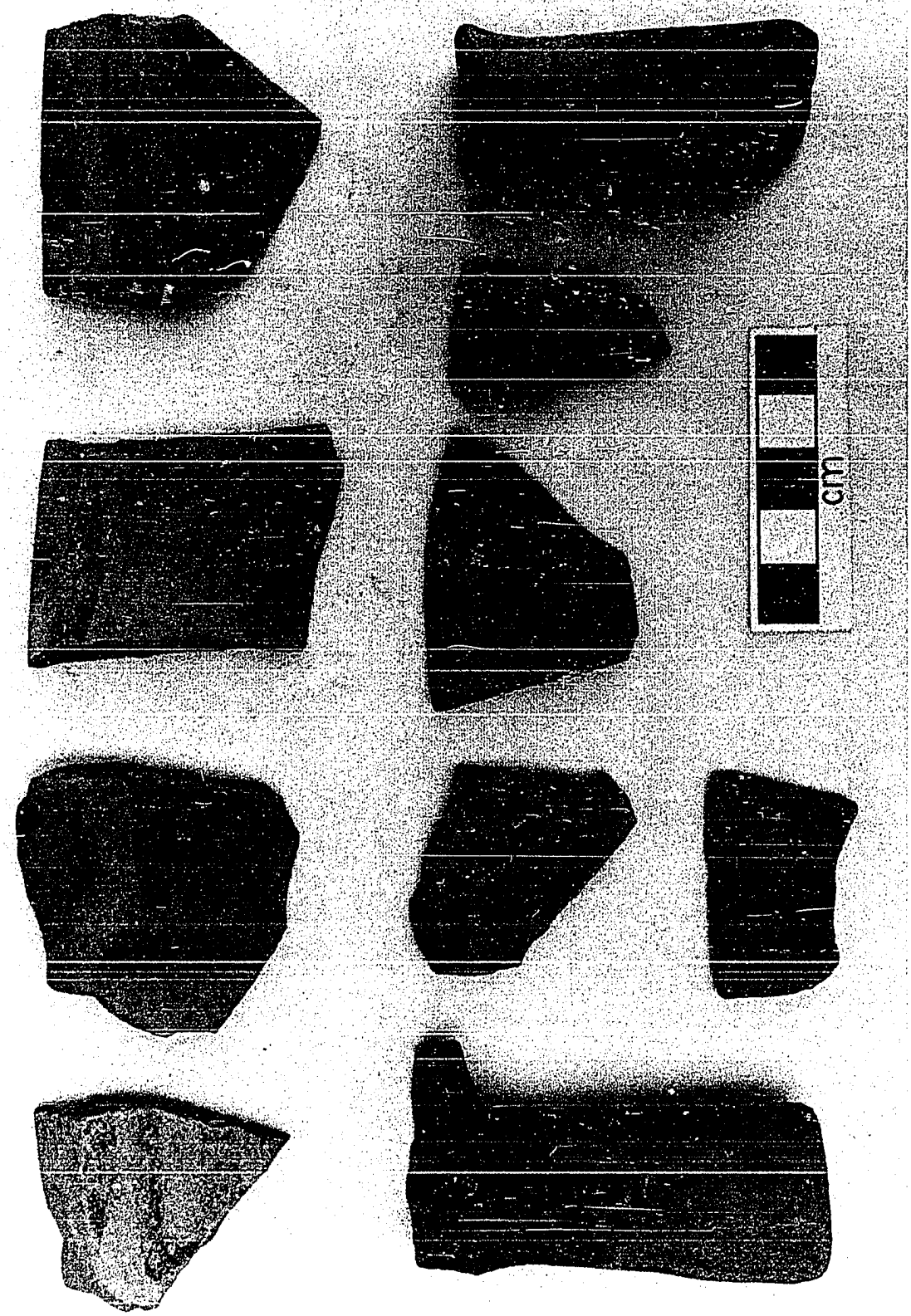

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communications). This idea is supported by the fact that the type appears to become more common toward the southwest corner of Morelos, closest to Taxco. A number of sites located in Kenneth Hirth's Rio Chalma reconnaissance project yield substantial numbers of Wavy Line Red-on-Cream and/or eroded molcajetes in surface collections (Figure 30); the largest number of sherds was found at the site of Tilancingo. Specimens of Wavy Line Red-on-Cream have also been recovered in surface collections at the site of Xochitepec, southeast of Xochicalco (see Alducín 1980:108), and a few examples were found at Tetla as well (Lynette Norr, personal communication).

The published ceramics most similar to this are the red on orange and brown on orange types identified by Lister (1947:Figures 6 and 7) on the basis of surface collections in the Teloloapan area of Guerrero (southwest of Taxco). Lister only illustrates five sherds of these types, and the resemblance is not extensive. Two illustrated sherds of Joroba Orange on Cream from Tula (Cobean 1978:Plates 135 and 136) show large scrolls not too different from some of the wider lined examples of Wavy Line Red-on-Cream; the Tula type is found in the Terminal Corral Complex, A.D. 900 to 950 (see Cobean 1978:404ff) and predates the occurrence of the wavy-lined type at Xochicalco. It may be noted that Wavy Line Red-on-Cream bears little or no resemblance to the "wavy line" Mazapan red on buff ceramics of the Early Postclassic Basin of Mexico and Tula (Cobean 1978). The most similar type of the Mazapan complex is the "sloppy Red on Buff" variant described by Blanton and Parsons (1971:Fig. 73), but the resemblance is not very close.

Deeply incised molcajetes with incision patterns similar to those found on Wavy Line Red-on-Cream sherds (see especially the Temazcalli example in Figure 27,I) occur in many parts of West Mexico throughout the

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Postclassic period. Notable examples are reported for: the Postclassic Tepetate and Chila phases at Apatzingan, Michoacan (Kelly 1947:45-51, 58-82); the Chapala (A.D. 1100-1300?) and Cojumatlan (A.D. 1300-1530?) ceramic complexes at Cojumatlan, Michoacan (Lister 1949:94); the "Postclasico Temprano" period Middle Balsas area (Muller 1979:57); and in the (Middle?) Postclassic ceramics of Teotenango in the Toluca Valley (Tommasi 1978: design group 57). Although molcajetes first appear in the Basin of Mexico and Tula at this general time (Linné 1934:81; Cobean 1978:413), the Xochicalco specimens bear more resemblance to the West Mexican molcajetes. It should be emphasized, however, that the only molcajetes with painted decoration like the Wavy Line Red-on-Cream vessels are the unpublished "Middle Balsas" examples in the Museo Nacional de Antropología and the vessel of unknown provenience shown in Figures 28 and 29. Until more data are available, the suggestion of Arana and Martinez that this type originated in the Taxco area is the most reasonable hypothesis. While the zone of manufacture of these vessels may have included Tilancingo and the southwestern portion of Morelos, they were probably imported into Xochicalco.

Red-on-Buff (C.8; n=4)

This is a residual category consisting of four very small body sherds which could correspond to Wavy Line Red-on-Cream, to Tommasi's (1978) Type A from the Toluca Valley, or to some as yet unisolated Morelos variety of red on buff ceramics. All four sherds have burnished red on buff decoration on their exterior; two interiors are similarly painted while one is unslipped smoothed and the other is a burnished red. Two examples have orange paste, one is buff, and one is orange-buff in color. Neither decorative patterns nor vessel form could be discerned in these sherds.

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Eroded Decorated Bowls (C.9; n=2)

Two eroded sherds exhibit traces of white and perhaps black painting on their exterior surface. These appear to be decorated bowls, but not much else can be said about them.

Serving Vessels: Summary of Forms

Although only 61 bowl rims were recovered in quantified Tilancingo levels, some significant relationships are revealed when forms and form subclasses are plotted by decorative class (Table 39). The only locally made classes are plain bowls and Guinda. The former has a greater variety for form subclasses represented, but this is probably due in large part to the greater number of plain rims. Hemispherical bowls represent the most common forms in both local classes, but Form 316 is found only in the Guinda class; this exclusive association is also present in the following Temazcalli phase. There is one recurved and one plato form among the Guinda rims, but neither subclass is represented in the plain bowls.

When locally made bowls are compared with imported bowls, further associations are revealed. Whereas over two-thirds of the local bowls have hemispherical forms, only one example is found among the imports. The reverse association holds for conical forms, however; only two are found in local bowls, whereas 30% of the imported bowls (all from Toluca Red-on-White) are conical. An even greater proportion of imported bowls (40%) have everted rims, whereas only one example is found in local wares. Finally, no straight flaring forms are represented in the local bowls, whereas one example is found in the Toluca Red-on-White class.

Bowl rim diameters for the Tilancingo phase are presented in Table 40. Only eight measurements are available, but when all classes

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TABLE 39

BOWL FORMS BY DECORATIVE CLASS, TILANCINGO COMPLEX

Form Subclass	Form	LOCAL			IMPORTED				TOTAL
		C.1 Plain	C.2 Guinda	C.9 Eroded Decorated	C.3 Graphite Guinda	C.5 Toluca Red-on-White	C.6 Toluca Black-on-Red	C.7 Wavy Line Red-on-Cream	
INCURVED	310	1							1
HEMISPHERICAL	315	23	2	1	1				30
	316		3						
CONICAL	319	2				6			8
STRAIGHT	322					1			1
EVERTED	325						1		9
	326							2	
	327	1						4	
	328						1		
RECURVED	332		1						2
	336							1	

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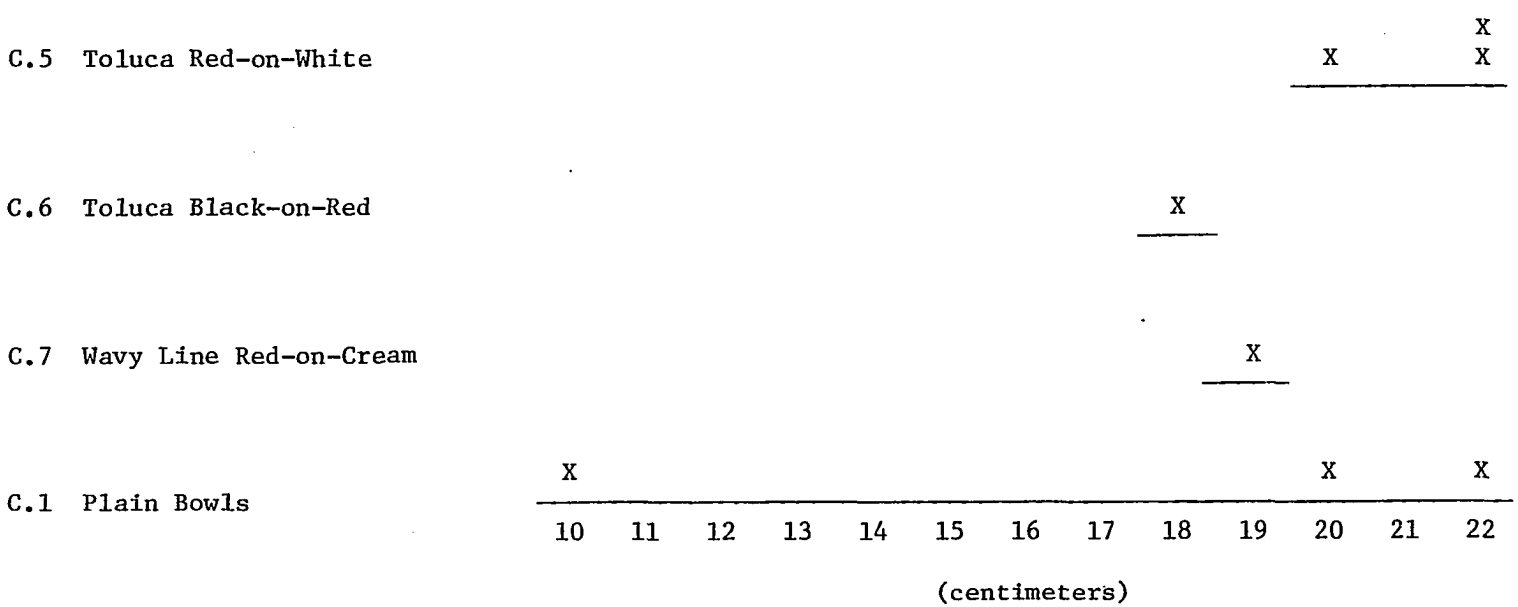
TABLE 39 (continued)

Form Subclass	Form	LOCAL			IMPORTED				TOTAL
		C.1 Plain	C.2 Guinda	C.9 Eroded Decorated	C.3 Graphite Guinda	C.5 Toluca Red-on-White	C.6 Toluca Black-on-Red	C.7 Wavy Line Red-on-Cream	
PLATO	362					1			2
	369		1						
FRAGMENTARY	300	1							8
	304	1							
	305	2							
	306	1		1		2			
TOTAL		32	7	2	1	10	2	7	61

TABLE 40

BOWL RIM DIAMETERS, TILANCINGO COMPLEX


C.5 Toluca Red-on-White
C.6 Toluca Black-on-Red
C.7 Wavy Line Red-on-Cream
C.1 Plain Bowls
10 11 12 13 14 15 16 17 18 19 20 21 22
(centimeters)

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represented are plotted together, two size modes are revealed: 10 cm. and 20 cm. These are both present in the local plain bowls, but the imported bowls exhibit only the larger mode.

In summary, bowl forms of the Tilancingo complex are quite simple and relatively homogeneous; the hemispherical subclass represents 71.8% of all local bowls, and the few remaining examples are spread among several other subclasses. The conical bowl, which is to become far more common in later phases, is present mainly as an import from the Toluca Valley. In terms of the number of forms represented, the 20 imported bowls exhibit more variety than do the 39 local bowls. Two bowl-size modes are represented, but given the small number of diameter measurements, a great deal of confidence cannot be placed in this finding.

Special Purpose Vessels and Other Ceramic Artifacts (D)

Texcoco Fabric Marked (D.1; n=4)

Four sherds of this distinctive central Mexican Postclassic ceramic were recovered from Tilancingo phase deposits at Xochicalco. As discussed by Tolstoy (1958:51-54), Parsons (1966:247-249), Sanders, Parsons and Santley (1979:172-175) and others, vessels of this type were used in the manufacture of salt around the shores of Lake Texcoco, and served as containers to transport the salt as well. The presence of Texcoco Fabric Marked pottery in Morelos (it is found in small numbers at most Postclassic sites in the western part of the state) may be taken as evidence for the importation of salt from the Basin of Mexico. To the best of my knowledge, this type has not been recovered from contexts prior to the Early Aztec period in the Basin of Mexico (see Cobean 1978; Sanders, Parsons and Santley

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1979; Parsons 1966:249; Tolstoy 1958:51ff), although it is present in the earliest part of that period (see discussion in Chapter 7).

Sahumadores (D.2; n=5)

Fragments of five sahumadores, or "frying-pan" censers, were recovered from Tilancingo deposits. They have medium to coarse buff paste, with either eroded or unslipped unsmoothed surfaces. The only example large enough to determine at least part of the vessel profile is illustrated in Figure 27,K. The junction of the handle at the level of the bowl rim (compare Séjourné 1970:Figure 41) contrasts with the earlier sahumadores common in the Phase G ceramics of Xochicalco, in which the bowl wall extends considerably above the handle joint (Cyphers n.d.).

Other Incensarios (D.3; n=2)

Two unslipped coarse paste sherds are included here based upon comparison with Postclassic incensarios known from Culhuacan (Séjourné 1970:Figures 39-41), Teopanzolco (Smith n.d.), and other sites. These sherds are too small to determine form.

Spindle Whorls (D.4; n=0)

Although no spindle whorls were recovered in the quantified Tilancingo levels, three examples were found in mixed Phase G/Tilancingo deposits in pit D2. Because these whorls resemble Postclassic examples closely and are different from the crude Phase G spindle whorls (Smith n.d.), they may be assigned to the Tilancingo complex. Two are small in size and one is large, suggesting the presence of both cotton and maguey spinning (see discussion under the Temazcalli complex below).

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Non-Postclassic Sherds (E; n=9)

Nine sherds dating to Phase G (or possibly F) were recovered in Tilancingo levels. Five of these are granular ware and the remainder exhibit attributes diagnostic of Phase G and/or Phase F (see Cyphers n.d.).

The Temazcalli Ceramic Complex

Quantified deposits dating to the Temazcalli phase include units 8, 10, 14, 16, 19, and 20; a total of 2436 sherds were recovered from these levels. Descriptive classes for the Temazcalli complex are shown in Table 41.

Cooking Vessels (A)

Comals (A.1; n=37)

Paste.--Buff-colored paste predominates over orange paste in the Temazcalli comals with a ratio of nearly two to one (Table 42). As usual, comal paste tends to be finer and harder than that of the other form-classes, but there is no association between these two dimensions within the comals. Nearly half of the comal rims exhibit fully oxidized paste. The only significant association among Temazcalli comal paste dimensions is between color and hardness; orange paste tends to be proportionally "harder" than buff paste (chi-square = 5.53; significance level = .063). Beyond this, there are no significant relationships between paste attributes and those of surface and form.

Surface.--Comal surface finish modes (interior only) are given in Table 43 with frequencies for both rims and total sherds. A continuum of orange and brown slips comprises the most common two categories in this

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TABLE 41

DESCRIPTIVE CLASSES FOR THE TEMAZCALLI CERAMIC COMPLEX

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	A. Cooking Vessels				
A.1	Comal	37	37	–	95
A.2	Basin	6	4 (2)[b]	2	21
A.3	Plain Olla	95	69 (3)	26	1383
	B. Storage/Transport Vessels				
B.1	Plain Olla (see Class A.3)				
B.2	Tlahuica Polychrome Olla	12	2 (2)	10	6
B.3	Taxco Black-on-White Olla	1	–	1	–
B.4	Red-on-Buff Olla	6	1 (1)	5	–
B.5	Miscellaneous Decorated Ollas	–	3 (1)	29	–
	(Total decorated ollas)	51	6	45	–
	C. Serving Vessels				
C.1	Plain Bowl	132	122 (5)	10	307
C.2	B-4 Polychrome (Tlahuica)	16	11 (1)	5	–
C.3	Teopanzolco Imports	20	15 (3)	5	–
C.4	Eroded Tlahuica Polychrome	5	3	2	–
C.5	Guinda	116	47 (1)	69	–
C.6	Graphite Guinda	8	3	5	–
C.7	Morelos-Puebla Black-on-Orange	7	3	4	–
C.8	Aztec I Black-on-Orange	–	–	–	1
C.9	Chalco-Cholula Polychrome	–	–	–	1

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TABLE 41 (Continued)

	Descriptive Class	Sherds with attribute data			Additional[a] Sherds
		Total	Rims	Bodies/ Appendages	
C.10	Toluca Red-on-White	26	11	15	-
C.11	Wavy-Line Red-on-Cream	15	10	5	-
C.12	Incised Redware	2	-	2	-
C.13	Red-on-Buff	10	3	7	-
C.14	Red-on-Orange	1	1	-	-
C.15	Eroded Decorated Bowls	16	10	6	-
	(Total decorated bowls)	242	117	125	-
	D. Special Purpose Vessels and Other Ceramic Artifacts				
D.1	Texcoco Fabric Marked	-	-	-	5
D.2	Sahumador	-	-	-	4
D.3	Other Incensario	-	-	-	27
D.4	Spindle Whorl	12	12 (7)	-	-
D.5	Figurine	-	-	-	2
	E. Non-Postclassic Sherds				
E.	Non-Postclassic Sherds	-	-	-	9
TOTAL COUNTS (Total sherds: 2436)		575	367	208	1861

Notes:

[a]This category represents sherds from quantified levels that were sorted and studied in a preliminary fashion, but not subjected to detailed attribute analysis.

[b]Figures in parentheses represent the number of vessels from burials or other special deposits included in the rims category.

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TABLE 42

PLAINWARE PASTE MODES OF THE TEMAZCALLI COMPLEX

Dimension	Comals		Basins		Ollas		Bowls	
	N	%	N	%	N	%	N	%
Color								
1. Orange	13	35.1	2	33.3	40	44.0	59	45.7
2. Orange-Buff	-	-	-	-	-	-	3	2.3
3. Buff	23	62.2	4	66.7	41	45.1	40	31.0
4. Brown	-	-	-	-	-	-	3	2.3
5. Grey	-	-	-	-	2	2.2	6	4.7
6. Black	1	2.7	-	-	8	8.8	18	14.0
Texture								
1. Very Fine	-	-	-	-	-	-	-	-
2. Fine	19	51.4	2	33.3	5	5.5	39	30.2
3. Medium	16	43.2	3	50.0	44	48.4	73	56.6
4. Coarse	2	5.4	1	16.7	40	44.0	17	13.2
5. Very Coarse	-	-	-	-	2	2.2	-	-
Hardness								
1. Normal	9	24.3	6	100.0	78	85.7	114	88.4
2. Hard	28	75.7	-	-	13	14.3	14	10.9
3. Soft	-	-	-	-	-	-	1	0.8
Oxidation[a]								
1. Complete	16	44.4	2	33.3	38	45.8	61	55.0
2. Partial	14	38.9	3	50.0	37	44.6	34	30.6
3. Slight	6	16.7	1	16.7	8	9.6	16	14.4
Number of sherds	37		6		91		129	

Note: [a]Sherds with black paste are not included in the counts for the oxidation dimension (see text for explanation.

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TABLE 43

PLAINWARE SLIP MODES OF THE TEMAZCALLI COMPLEX

Mode	Rims + Appendages		Total Sherds[a]		Burial Vessels[b]	Surface Treatment Index		
	N	%	N	%		Composite[c]	Int.	Ext.
COMAL (total)	37	-	132	-				
non-eroded	36	100.0	125	100.0		6.5		
1. unslipped	5	13.9	24	19.2		4.6		
2. orange	11	30.6	31	24.8		6.4		
3. brown	12	33.3	40	32.0		6.7		
4. black	5	13.9	24	19.2		7.6		
5. streaky black	3	8.3	6	4.8		7.0		
BASIN (total)	6	-	27	-				
non-eroded	6	100.0	27	100.0		5.2	6.0	4.4
1. unslipped	-	-	2	7.4		-	-	-
2. orange	4	66.7	17	63.0	1	5.4	6.0	4.8
3. brown	1	16.7	4	14.8		5.0	7.0	3.0
4. black slip interior	1	16.7	2	7.4	1	4.5	5.0	4.0
5. black smudge	-	-	2	7.4		-	-	-
OLLA (total)	95	-	1475	-				
non-eroded	92	100.0	1448	100.0		5.5		
1. unslipped	35	38.0	499	34.5	2	3.7		
2. orange	16	17.4	183	12.6		6.7		
3. brown	36	39.1	497	34.3	1	7.0		
4. black slip	1	1.1	37	2.6		8.0		
5. black smudge	1	1.1	101	7.0		5.0		
6. white slip	3	3.3	45	3.1		3.0		
7. unknown[d]	-	-	86	5.9		-		

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TABLE 43 (continued)

	Mode	Rims + Appendages		Total Sherds[a]			Surface Treatment Index		
		N	%	N	%		Composite[c]	Int.	Ext.
BOWL	(total)	136	-	438	-				
	non-eroded	112	100.0	422	100.0		6.3	6.8	5.8
1.	unslipped	8	7.1	33	7.8		3.3	4.2	2.3
2.	orange	46	41.1	158	37.4	5	6.7	6.9	6.4
3.	brown	30	26.8	114	27.0		6.6	7.0	6.1
4.	black slip interior	9	8.0	55	13.0		6.4	7.6	5.2
5.	mottled brown	7	6.3	19	4.5		7.5	7.9	7.1
6.	black smudge	11	9.8	32	7.6		6.2	6.9	5.4
7.	white slip	1	0.9	1	0.2		-	-	-
8.	streaky black interior	-	-	9	2.1		-	-	-
9.	other	-	-	1	0.2		-	-	-

Notes:

[a]Total sherds includes body sherds not subjected to attribute analysis in addition to the rims and appendages.

[b]This column indicates the number of vessels from burials or other special deposits included in each mode.

[c]The composite surface treatment index is the average of the interior and exterior values (for the bowls and basins).

[d]The unknown category consists of body sherds that could not be confidently sorted by slip; see text for discussion.

complex; the percentage of unslipped comals is considerably less than in the Tilancingo complex. Surfaces are most frequently polished (Surface Treatment Index of 6.5) in contrast to the commonly burnished comals of the previous phase (S.T.I. of 5.1). The only consistent association between finish and treatment is that all black slipped comals are polished; these examples also tend to have a larger angle of elevation than the other slip categories.

Form.--Apart from incomplete forms (404 to 406), there are fifteen distinct comal forms present in the Temazcalli complex. These forms and their classification into subclasses are listed in Table 44. The slight reduction in the Elevation Index from the previous phase (3.00 to 2.76) reflects the introduction of flat or horizontal forms for the first time. Direct rims are the most common variant, with the sharp break angle variant next in frequency. Most comals (91.7%) continue to have a definite ridge separating the rim from the roughened exterior; this trait becomes less common in the succeeding phases.

Basins (A.2; n=6)

The paucity of quantified sherds makes lengthy descriptions of Temazcalli basins inappropriate. Both orange and buff pastes are present, textures center on medium, hardness is normal, and oxidation variable (Table 42). Orange slipped surfaces, both interior and exterior, are the most common variety (Table 43), while surface treatment is quite variable. Of the four quantified basin sherds from refuse deposits, one is a rim fragment (Form 206), one exhibits Form 212, and two are bodies with tab handles. Two complete basins were recovered from Burial 1.

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TABLE 44

COMAL FORMS AND FORM SUBCLASSES OF THE TEMAZCALLI COMPLEX

	Attribute	N	%	Constituent Forms
I.	COMAL ELEVATION	(37)[a]		
	1. flat	2	5.4	404(1) 416(1)[b]
	2.	11	29.7	405(6) 417(1) 436(2) 437(1) 445(1)
	3.	18	48.6	406(6) 411(1) 415(1) 428(2) 439(6) 440(1) 448(1)
	4. high	6	16.2	421(2) 422(1) 433(2) 434(1)
	Elevation index (mean): 2.76			
II.	COMAL FORM	(24)[a]		
	1. no ridge	2	8.3	411 415
	2. rounded ridge	2	8.3	416 417
	3. tapered rim	3	12.5	421 422
	5. sharp break angle	5	20.8	428 433 434
	6. direct rim	12	50.0	436 437 439 440 445 448

Notes:

[a]Number of rims scored on each variable. There are more rims scored on the elevation variable because rim fragments could often be oriented to provide the elevation angle, although they could not be assigned to a more definite form subclass.

[b]Figures in parentheses represent the number of each form present; underlined forms are unique to the Temazcalli complex.

These vessels represent Forms 224 and 201 (odd) and are illustrated in Figures 31,A and B, respectively. Four of the six basins have tab handles and one has a horizontal loop handle.

Plain Ollas (A.3; n=95)

Paste.--Orange and buff paste are represented in approximately equal numbers among the Temazcalli plain ollas, as are the medium and coarse textures (Table 42); unlike the Tilancingo ollas, however, these dimensions are not associated. Half of the examples are fully oxidized. Paste attributes are not significantly associated with attributes of surface or form.

Surface.--There is a decline in the proportion of unslipped ollas from the previous phase, but this mode and brown slip continue as the primary modes of surface finish (Table 43). The problem of determining the presence or absence of a slip, noted above for Tilancingo olla body sherds, continues into this complex. I do not think that the extent of misclassification is very high (for reasons discussed above), but to keep the level of uncertainty down, 86 olla body sherds from Temazcalli levels were classified as "unknown" rather than as unslipped or brown slip (see Table 43). Slipped ollas tend to be more highly polished in the Temazcalli complex than in the Tilancingo phase, and a pronounced difference in surface treatment between slipped and unslipped ollas is also found in the Temazcalli examples (see below).

Form.--Sixty-nine plain olla rims are included in the quantified sample; fifty-three of these are incomplete and only assignable to a fragmentary form category (104-107), while the remaining sixteen rims fall

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Figure 31. Ceramics of the Temazcalli Complex. A-B, basins, A (82-5, 224), B (87-10, 201); C, olla (16-1, 117).

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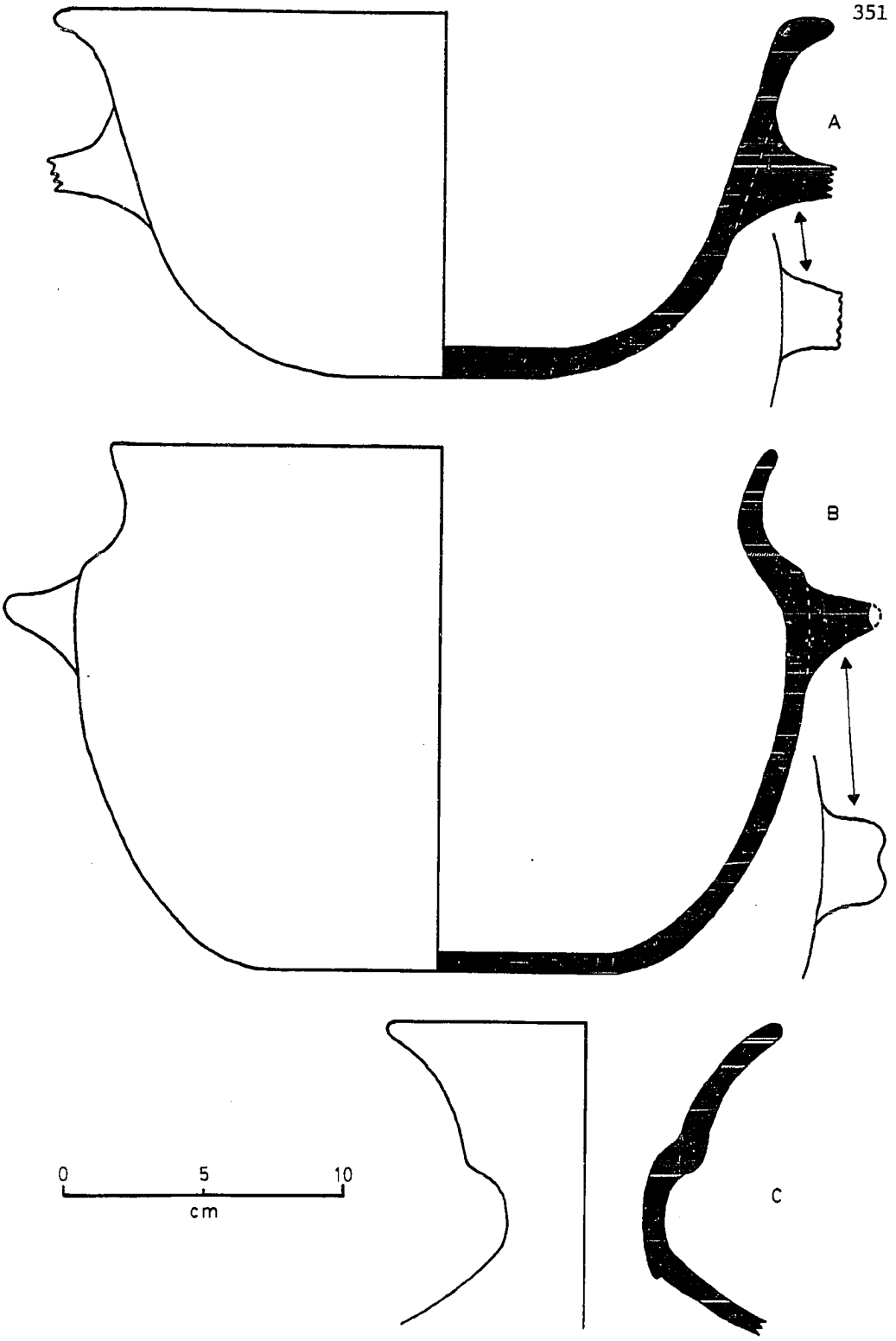

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Figure 32. Ceramics of the Temazcalli Complex. A-C, ollas, A (82-9, 127), B (82-18, 115), C (82-12, miniature form).

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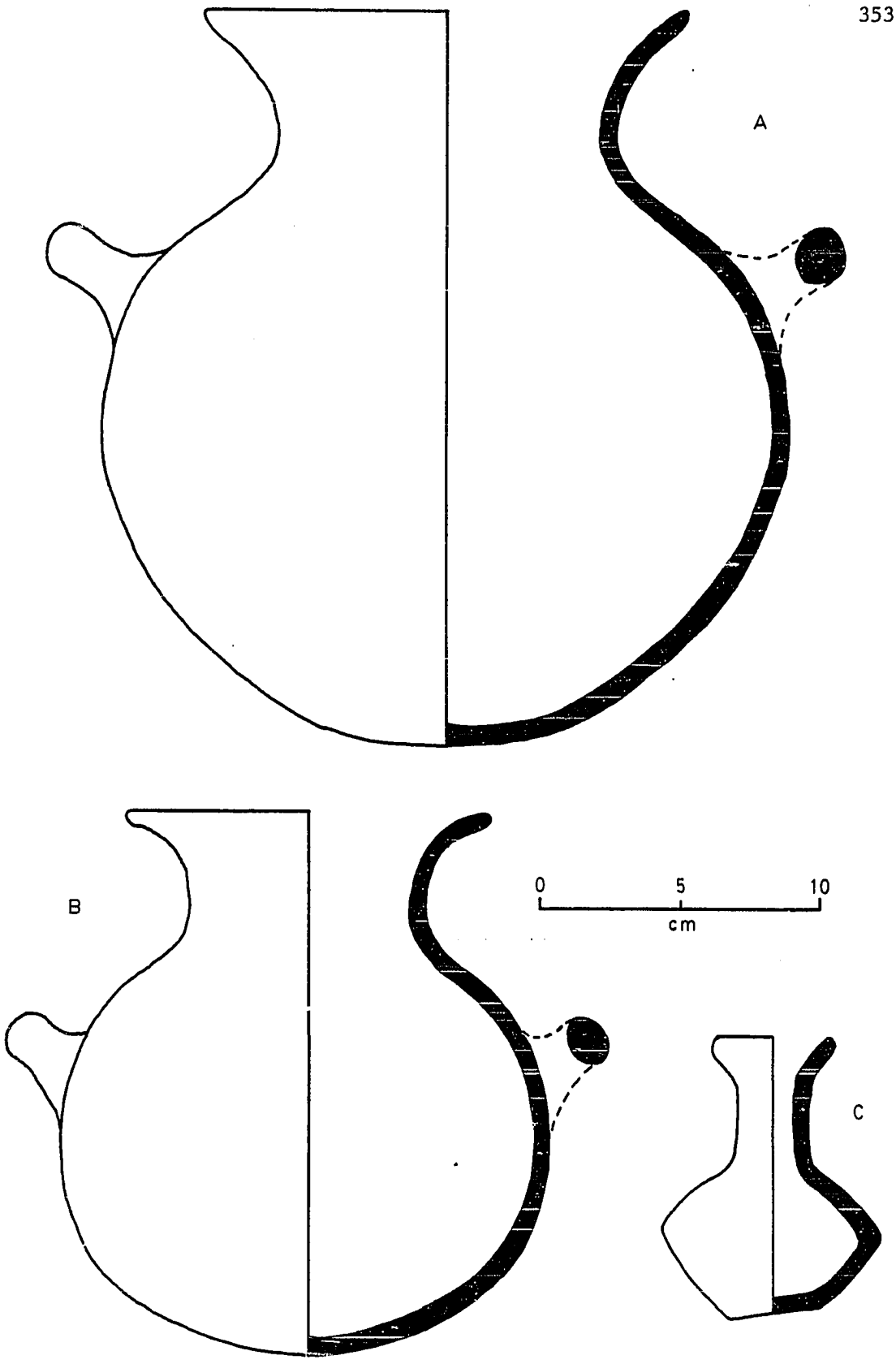

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TABLE 45

PLAIN OLLA FORMS AND FORM SUBCLASSES OF THE TEMAZCALLI COMPLEX

Subclass	N	%	Constituent forms
OLLA RIM CURVATURE	(62)		
1. vertical	-	-	-
2.	8	12.9	107(5) 111(2) 113(1)[a]
3. moderate	26	41.9	106(22) 115(1) 117(3)
4.	22	35.5	105(22)
5. outcurved	6	9.7	104(4) 127(2)
- other forms	4	-	131(1) 133(2) 139(1)
Curvature index (mean): 3.42			
OLLA NECK HEIGHT	(11)		
1. short	1	9.1	131(1)
2. medium	4	36.4	115(1) 127(2) 139(1)
3. high	6	54.5	111(2) 113(1) 117(3)
Height index (mean): 2.45			

OLLA RIM DIAMETERS[b]

13	14	15	16	17	18	19	20	21	22	23	24	25	26
D X	D X			X	X				X				X

Notes:

[a]Figures in parentheses represent the number of each form present; underlined forms are unique to the Temazcalli complex.

[b]The two diameters measurements obtained from Temazcalli polychrome ollas are included here for comparison; theyare designated by "D" and the plain olla rims by "X." Diameters are measured in centimeters.

TABLE 46

OLLA FUNCTIONAL MODES OF THE TEMAZCALLI COMPLEX

Modes	Unslipped	Slipped
SURFACE TREATMENT		
1. unsmoothed	1	-
2. smoothed	12	4
3. partially burnished	4	2
4. streaky burnished	-	1
5. burnished	17	5
6. partially polished	-	4
7. streaky polished	-	12
8. polished	1	28
Treatment Index	3.7	6.7
HANDLES		
1. horizontal loop	3	3
2. vertical loop	1	5
3. indeterminate loop	9	6
RIM DIAMETER		
1. 13-14 cm	2	1
2. 17-18 cm	2	-
3. 22-26 cm	2	-
Mean Diameter	18.3	14.0

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into eight distinct forms. Temazcalli olla rims tend to be slightly more outcurving than their Tilancingo predecessors (Curvature Index of 3.42, compared to 3.29), as shown in Table 45. Eleven rims are complete enough to be classified by height; high rims predominate over short rims in this phase. The seven diameter measurements available range from 13 to 26 cm; there is little association between diameter and olla rim form, or between diameter and form subclass (thus it cannot be said that more outcurved rims have larger diameters). The most common non-fragmentary form is number 117, which is unique to the Temazcalli complex. This unusual form, which consists of a high neck with a bulge midway between the olla body and the rim, is also found in the Teopanzolco Ceramic Complex; a relatively complete example is illustrated in Figure 31,C. Three complete plain ollas were recovered from the main Terrace 85 burial; these are shown in Figure 32, A,B,C. The first two examples are not untypical of the Postclassic ollas of Morelos in general, while the third represents an unusual miniature form. Miniature ollas were recovered in abundance from the Cuauhnáhuac phase burials at the site of Coatetelco (Smith n.d.), but none of them resemble this particular specimen. This miniature olla was one of three recovered in the burial; the others are decorated in red on buff and in Tlahuica polychrome designs and are described in the appropriate section below. Three wedge-rimmed ollas (Forms 133 and 139) are included in the Temazcalli sample.

Discussion.--Data bearing on plain olla function are assembled in Table 46; the patterns are similar to those observed for Tilancingo phase ollas (Table 35) and will only be described briefly here. The higher surface treatment index of slipped ollas compared to unslipped ollas is probably due in part to general technique (slipped surfaces are more

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carefully treated in all form classes) as well as to the probably functional differences between the two groups. The functional argument for the Temazcalli finish/treatment relationship is weakened by the fact that an unslipped/slipped treatment difference of the same order (3.2) is found among the bowls of this complex; the corresponding figure for Temazcalli comals is 2.2. Olla handles in this complex follow the postulated pattern: unslipped ollas tend to have horizontal handles, while slipped ollas tend to have vertical handles; similarly, the decorated ollas all have vertical handles. Rim diameters correspond well to hypothesized function; all of the larger openings are found on unslipped ollas. The one diameter on a slipped olla is 14 centimeters; the two polychrome olla diameters are also in this range (13 and 14 centimeters). Both of the full-sized burial ollas from the Temazcalli phase are unslipped and have horizontal handles; the mouth diameters are 13 and 17 centimeters. The classification of these vessels as cooking pots is strengthened by the fact that they both exhibit blackened patches on the exterior bases, suggestive of use over a fire.

Storage/Transport Vessels (B)

Plain Ollas (B.1)

See discussion under section A.3 above.

Tlahuica Polychrome Ollas (B.2; n=18)

Definition.--This decorative type consists of all ollas painted in the distinctive "Tlahuica polychrome" style. This style, found on both bowls and ollas in most of Middle and Late Postclassic Morelos, is formally defined by the colors employed, the kind of decorative zone dividers used,

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and a set of characteristic motifs depicted. Tlahuica polychrome painting is executed in black and red designs on a white background. Orange is occasionally used to paint wide bands but not decorative motifs. The Tlahuica polychrome style utilizes groups of thin black parallel lines (usually three) as dividers between decorative zones, and the most common motifs are scrolls, interlocking S-motifs, and wavy lines; flowers, concentric circles, and checkerboards are also found. The general Tlahuica polychrome style may be divided into a number of constituent decorative types, distinguishable on formal, spatial and chronological grounds. A major problem in the Postclassic archaeology of Morelos is the fact that the above definition of the Tlahuica polychrome style also describes one of the several styles of decoration found in the Postclassic Toluca Valley. This style, included in Tommasi's Type B (1978: Lámina 35), closely resembles some examples of the Tlahuica Polychrome Types F and G of the Teopanzolco ceramic complex (Smith 1981a, 1981b, n.d.). Of the three Tlahuica Polychrome types found at Xochicalco (not counting Teopanzolco imports), only the Tlahuica polychrome ollas may overlap with Toluca styles; the other Western Morelos Tlahuica polychromes--B-3 and B-4 bowls--do not have any counterpart outside of Morelos. The following description of Tlahuica polychrome ollas includes three sherds from Early Cuauhnáhuac levels and two sherds from Late Cuauhnáhuac deposits. Only 12 of the Temazcalli examples were subjected to the attribute analysis.

Paste.--Of the sixteen sherds in which paste was studied, eleven have buff paste, four have orange paste, and one is black. All four orange paste sherds are fine-textured, as are three buff sherds; the remainder have a medium texture. Oxidation is variable, with all three modes represented.

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Two of the orange sherds are from Temazcalli levels and two are from Late Cuauhnāhuac levels.

Surface.--All of the sherds have polished black and red on white surfaces.

Decoration.--Two complete Tlahuica polychrome ollas were recovered from Burial 1; the first (Figure 33) is a large vessel (height = 30.5 cm; mouth diameter = 14 cm), while the second (Figure 34, right) is a miniature (height = 9.3 cm; mouth diameter = 4 cm). These vessels, together with some large sherds recovered in unit 10 (Figure 35; Figure 36,A), illustrate the nature of decoration on the Temazcalli polychrome ollas. The whole exterior of the vessel is covered with designs down to the base. The black line zone dividers can be seen, and the primary motifs are scrolls, interlocking S-motifs, concentric circles, and checkerboards. The two large rims (Figure 33; Figure 36,A) are decorated along the top two to three centimeters of the interior surface; the former has two sets of parallel red lines between which are interlocking black scrolls, and the interior rim decoration of the latter can be seen in Figure 36,A.

Form.--The two large rims referred to above represent Forms 128 (14 cm) and 129 (13 cm) respectively; the miniature Tlahuica polychrome olla is not classified as to specific form. One additional rim from Early Cuauhnāhuac levels represents an incomplete form (no. 106). Each of the two complete vessels, large and small, has three vertical handles; one additional vertical handle was recovered as well.

Discussion.--The presence of two complete vessels of Tlahuica polychrome ollas and the large size of some of the sherds makes up for the small number of sherds recovered (only seventeen of the twenty-three

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Figure 33. Tlahuica Polychrome olla of the Temazcalli Complex (82-13, 128).

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Figure 34. Miniature ollas of the Temazcalli Complex. Left to right, plain olla (82-12); Red-on-Buff olla (82-6); Tlahuica Polychrome olla (82-14).

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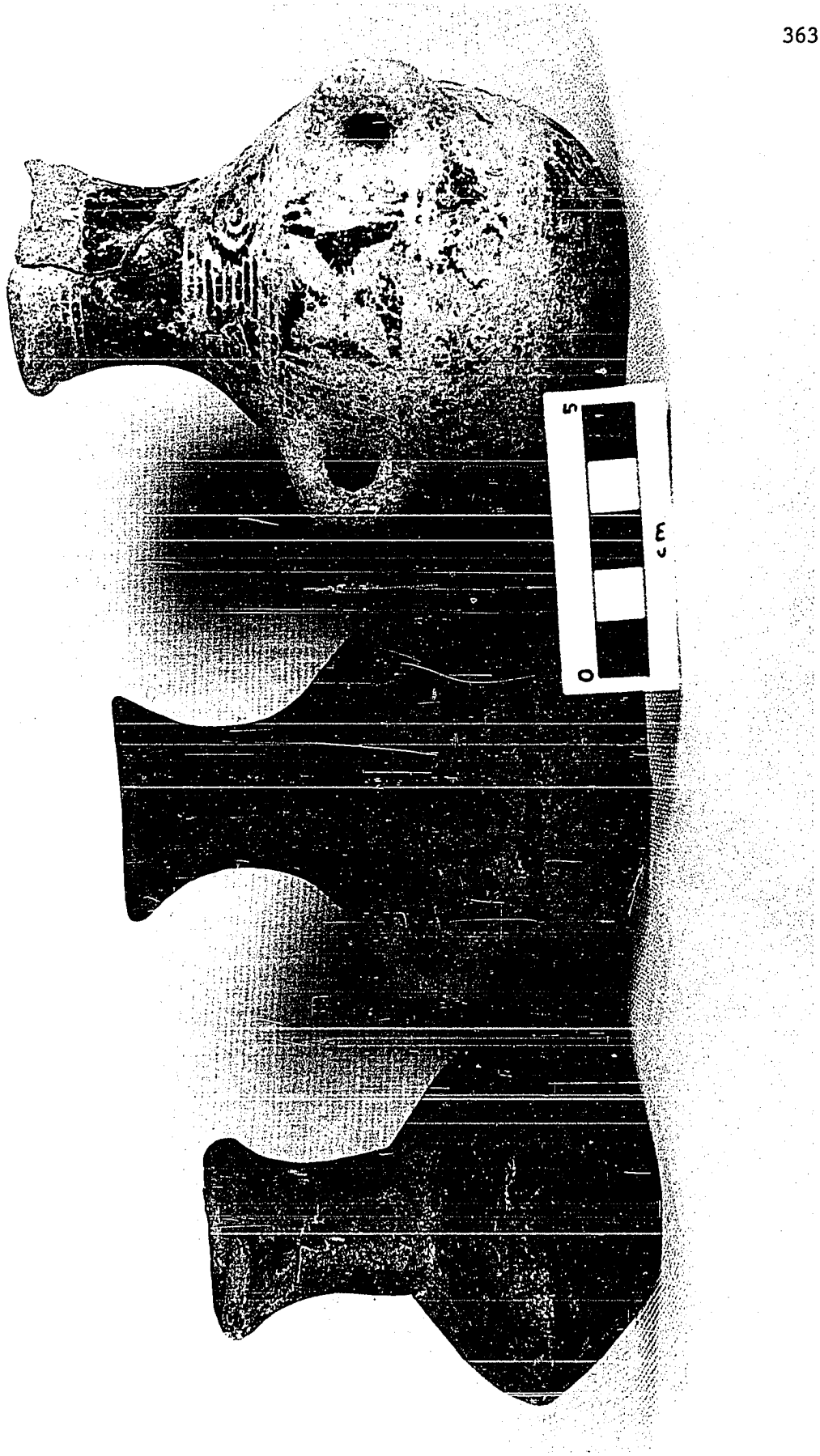

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Figure 35. Tlahuica Polychrome olla sherds of the Temazcalli Complex from unit 10.

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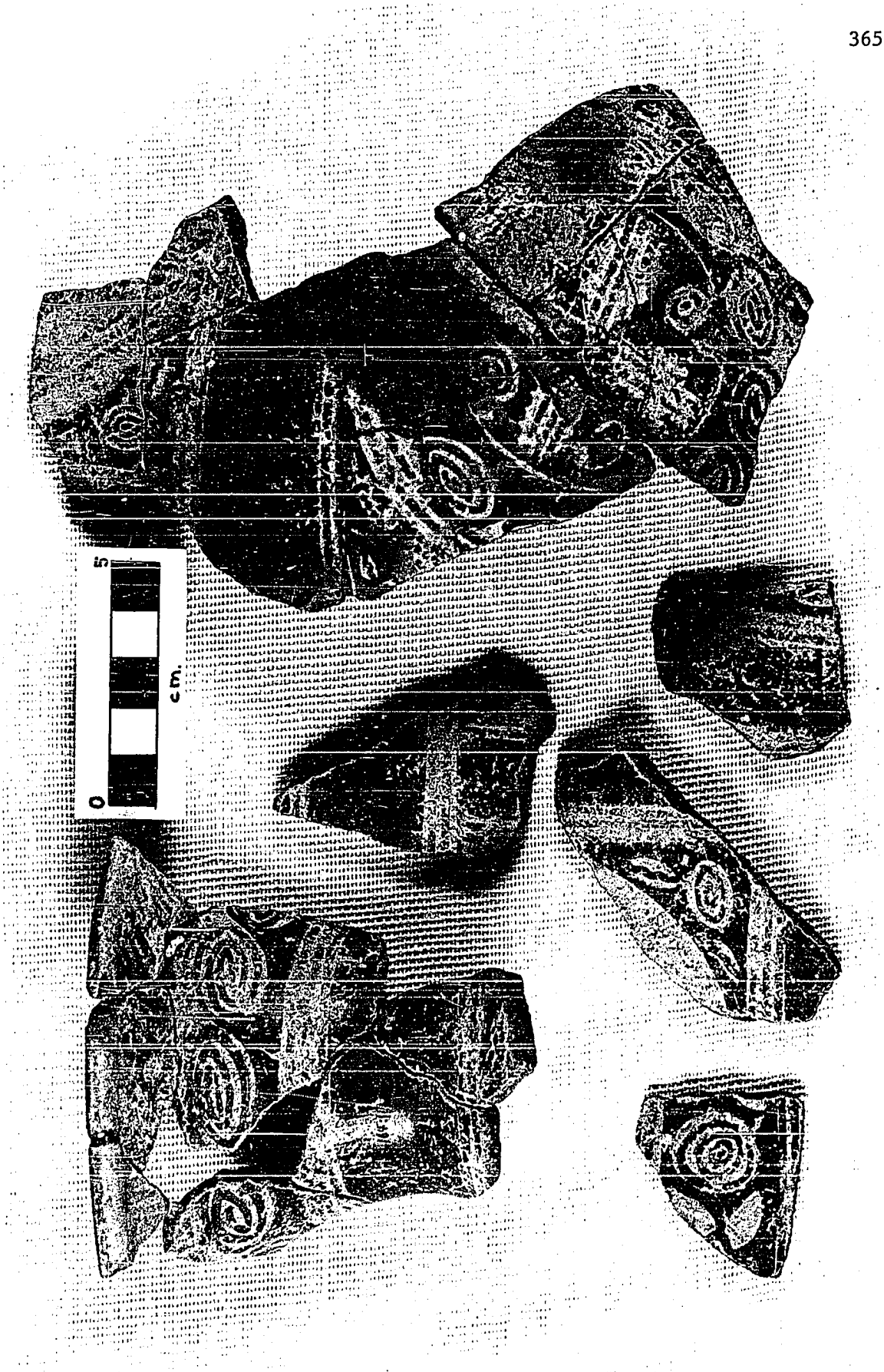

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Figure 36. Ceramics of the Temazcalli Complex. A, Tlahuica Polychrome olla (10-34, 129); B-C, Red-on-Buff ollas, B (82-6, miniature), C (20-36); D, Red-on-White olla (20-38); E, red on yellow olla (82-16); F-G, orange slipped bowls, F (82-8, 310), G (82-11, 315).

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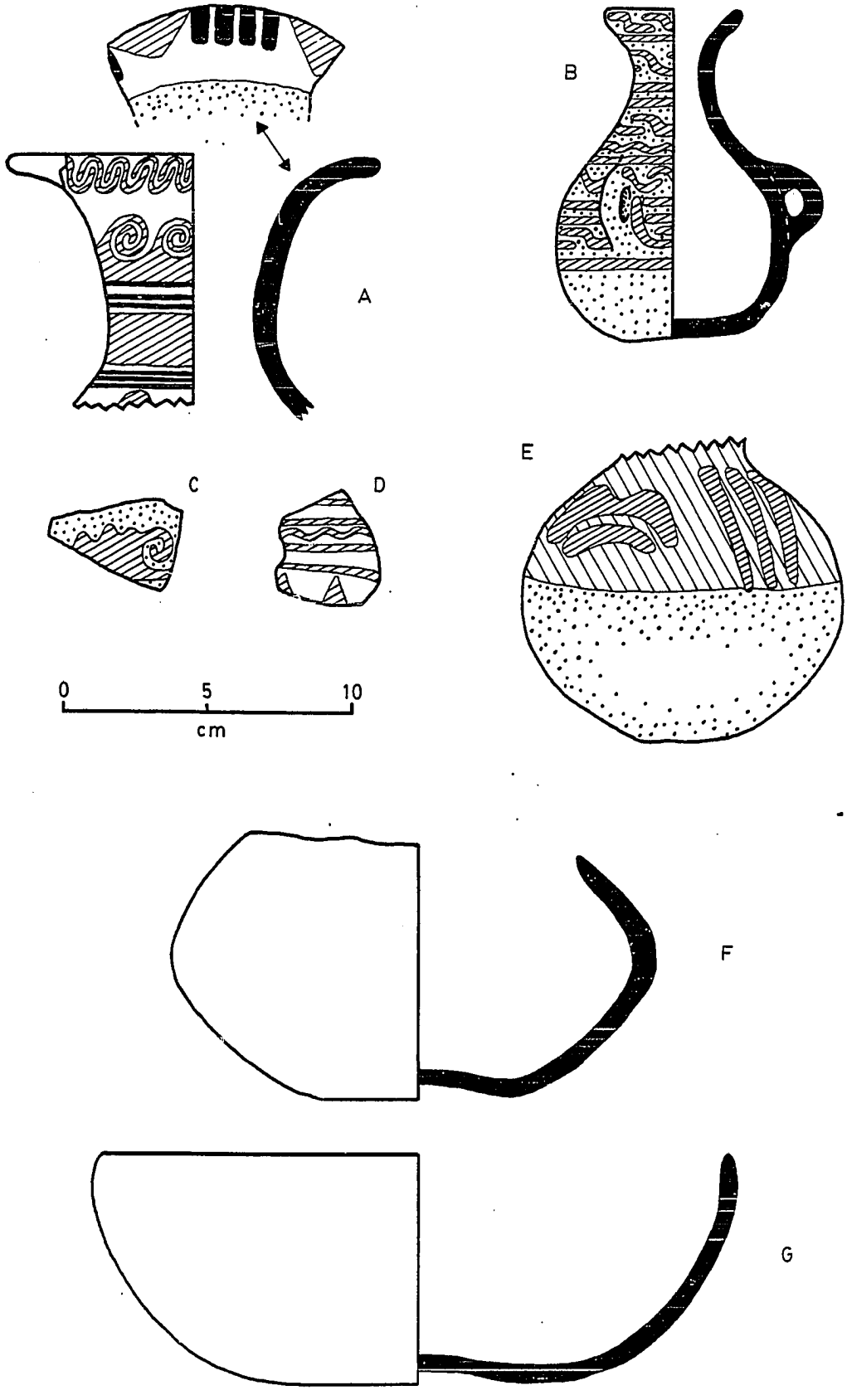

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sherds were quantified--attributes were not recorded for six body sherds that are obviously from the same vessel). Although Noguera and Piña Chán (1956/57) do not report finding any sherds of this type at Teopanzolco, deposits from that site, studied by the author, contain a larger proportion of Tlahuica polychrome ollas than do the Temazcalli deposits (Smith n.d.). The Vaillants report the existence of this type in the ceramics of the Teopanzolco complex from Gualupita (Vaillant and Vaillant 1934:91,92). The designs and forms of the Temazcalli phase examples at Xochicalco are quite similar to those from the Cuernavaca region. Nearly all of the Teopanzolco examples exhibit a medium textured, buff paste, and the rock and mineral paste inclusions of petrographic samples from the two ceramic complexes (one sample from each) are identical (Cyphers 1982). It is very possible that the Xochicalco examples were imported from the Cuernavaca area; at least one and probably two other vessels from Burial 1 are imported Tlahuica Polychrome bowls from Teopanzolco.

Additional comparisons may be made with decorated ollas reported from the Toluca Valley. The only large decorated ollas reported from that area are painted in red on buff designs quite different from the Tlahuica polychrome ollas (e.g. Tommasi 1978:139). However, at least one small olla from Teotenango (height, ca. 19 cm) is decorated in patterns entirely consistent with those of the Tlahuica polychrome ollas, but in red on a plain buff surface (Tommasi 1978:140). Furthermore, the same design characteristics, in red and black on white, are found on small ollas with a distinctive top carrying handle, but with different patterns of color use (p. 142); the parallel zone dividers are red instead of black, and the only use of black is in wide bands around the vessel. In short, a number

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of the Teotenango decorated ollas illustrated by Tommasi (1978) exhibit patterns of decoration nearly identical to the Tlahuica polychrome ollas, but with different color schemes and on different vessel forms.

Taxco Black-on-White Ollas (B.3; n=1)

This type consists of large ollas painted with wide-lined black designs on a background of white slip or paint. The one sherd of Taxco Black-on-White recovered at Xochicalco was identified with the help of Wanda Tommasi; it exhibits interlocking S-motifs, and is too small to illustrate. The place of origin of this type is said to be in the neighborhood of Taxco, Guerrero (Wanda Tommasi and Paul Schmidt, personal communications); this interpretation is strongly supported by petrographic analysis. Taxco is situated in one of the few zones of schist (metamorphic) deposits near Morelos (there are none in the state itself). A sherd of Taxco Black-on-White from Coatetelco was found to contain schist inclusions in the paste; it is the only example among the fifty-five thin sections from Postclassic Morelos that contains schist (Cyphers 1982).

Published illustrations of Taxco Black-on-White ollas are not available, but recent excavations yielded examples of this type from various parts of Morelos. Several whole vessels were excavated by Wanda Tommasi at the site of Olintepec in Eastern Morelos; these were on display at the "Casa de Morelos" museum in Cuautla, Morelos, during 1980 and 1981. The chronological placement of the vessels at Olintepec has yet to be determined, but they probably date to the Middle or Late Postclassic periods. Sherds of this type have also been recovered from the site of Tetla (not far from Olintepec), pertaining to the Middle Postclassic Tetla Ceramic Complex (Lynette Norr, personal communication). The Taxco

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Black-on-White sherds found at Coatetelco all pertain to the Cuauhnáhuac phase deposits (Smith n.d.); the petrographic sample is from this material. In sum, Taxco Black-on-White ollas have been recovered from Middle and Late Postclassic contexts in various parts of the state of Morelos, and these specimens are traceable to the Taxco area of Guerrero on the basis of both stylistic and petrographic evidence. What is needed now is a study of the Postclassic ceramics of Taxco in order to clarify the nature and significance of this type of decorated olla.

Red-on-Buff Ollas (B.4; n=6)

This class is a residual category in which the only criterion is red on buff painting on ollas. In addition to a miniature red on buff olla recovered from Burial 1 (Figure 34, center; Figure 36,B), five sherds from full size ollas were recovered from refuse deposits. Of these five sherds, four have orange and one has buff paste; four have coarse texture and one is medium textured. All surfaces but one are burnished, and the only complete pattern of decoration consists of the horizontal bands of interlocking S-motifs on the miniature olla (Figure 36,B); in addition, one body sherd is painted with a modified step-fret design (Figure 36,C). The one full-size olla rim is a fragment (Form 105). Two examples of vertical handles are present (the miniature olla and one other). In sum, Red-on-Buff ollas represent a rare class of decorated olla present in several of the Postclassic ceramics complexes of Morelos; none of the Temazcalli examples resemble the Red-on-Buff ollas of the Postclassic Toluca Valley (Tommasi 1978).

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Miscellaneous Decorated Ollas (B.5; n=32)

This class includes several categories of decorated olla sherds that either cannot be classified further due to small size, or have unusual color patterns found only on one or two examples.

Red-on-White (n=27).--This category includes decorated olla fragments that could pertain to the Tlahuica polychrome ollas, to the Toluca Valley Red-on-White ollas, or else to some other variant of red on white or polychrome ollas. Buff paste predominates over orange at a ratio of nearly two to one. The majority of the sherds have medium textured paste; about half the sherds are completely oxidized. Fifteen examples have burnished surfaces, while twelve are polished. One of the larger sherds is illustrated in Figure 36,D; it shows the most common decorative motif on these sherds--wavy lines and parallel straight line. Three rim fragments were recovered--two are Form 105, one is Form 104; one rim has red triangles as the exterior rim decoration. No handles were found.

Black-on-White (n=1).--One olla sherd decorated in black on white and not resembling the Taxco Black-on-White olla type was recovered. The paste is orange and medium textured. The sherd was not drawn because of its small size.

Black-on-Buff (n=2).--Two olla body sherds decorated in black designs on a plain buff surface were recovered. Both have buff paste. One has thick, wavy black lines, while the other has thin, wavy lines. These sherds may represent variants of the Red-on-Buff olla class, but the small size makes comparison difficult.

Red-on-Yellow (n=2).--Two excavated examples of Red-on-Yellow ollas were recovered; one is a small body sherd and the other a partial

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vessel from Burial 1 (Figure 36,E). Both have smoothed exterior surfaces painted with patches of red on a yellow slipped background. This decoration does not resemble that of Mason's Red on Orange olla type from Coatlan Viejo (1980: Figures 51 and 52). Similar patterns of olla decoration are not found in the published literature on Postclassic Central Mexioc.

Serving Vessels (C)

Plain Bowls (C.1; n=136)

Paste.--Orange paste bowl sherds outnumber buff examples at a ratio of three to one (Table 42). Most examples have medium texture, although fine texture is also common. On the average, buff paste bowls tend to be slightly finer than orange bowls. More than half of the sherds are fully oxidized, and there is a slight tendency for orange paste to be better oxidized than buff paste.

Surface.--Seventeen of the twenty-two interior/exterior surface finish combinations utilized at Xochicalco in the Postclassic period are represented in the plain bowls of the Temazcalli complex (Table 47). These combinations were grouped into nine surface finish modes (Tables 43 and 47) according to procedures outlined in the discussion of the Tilancingo plain bowls. In most cases, the formation of the modes was straightforward, but two problems arose with the black slipped, mottled brown, and smudged black finishes. In the later Early Cuauhnáhuac ceramics, the mottled brown and black smudged finishes grade into one another, and exhibit similar patterns with respect to other attributes; they clearly form a single class, which is referred to as "brown-black." Furthermore, no sherds of that phase were classified as black slipped on both the interior and exterior surfaces.

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TABLE 47

SURFACE FINISH MODES OF TEMAZCALLI PLAIN BOWLS

Interior	Exterior: No Slip	Or.	Brn.	Blk.	Mott. Brn.	Smudge	White	Other	TOTAL
Unslipped	8/33[a]	-/4							
Orange	3/27	43/127	-/8						
Brown	1/8		29/98						
Black	2/7	7/33	-/15	8/27					
Streaky Black	-/2	-/7							
Mottled Brown					7/19				
Smudged Black						3/5			
White							1/1		
Other								-/1	
TOTAL									112/422

[a]Entries list counts of rims and body sherds, separated by a slash.

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Thus for the Early Cuauhnáhuac plain bowls, black slipped interior is a minor mode, and black-brown a major mode encompassing both mottled brown and black smudged surfaces. In the Temazcalli phase, on the other hand, there are significant differences between mottled brown and black smudged bowls; for example, the former are more highly polished and more fully oxidized than the latter. Similarly, examples with black slip interiors exhibit differences in paste from sherds classified as black slip on both surfaces.

The above differences at first suggested the existence of four separate modes of surface finish (black slip interior; black slip both surfaces; mottled brown; and black smudged). However, the sherds classified as black slipped on both surfaces are anomalous. While black slipped interiors are common in many of the Postclassic ceramic complexes of Morelos, only a few scattered sherds were identified as black slipped on the exterior surface, except in the Temazcalli complex. The anomalous character of these sherds was noted in the laboratory, but at the time it was not known that all of these sherds were from the same complex (at Xochicalco, only one sherd of this category is from another complex). When the attribute data on these sherds is compared with that on the black smudged sherds, the two categories are nearly identical. Therefore, it seems reasonable to conclude that sherds identified as black slipped on both surfaces are misclassified smudged sherds. Five of the eight rims from this group have black paste, presumably from smudging. Black slip interior and mottled brown are distinctive modes of surface finish which may be distinguished from the smudged examples on the basis of paste, surface treatment, and, to a lesser degree, vessel form. The existence of

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these three modes of black and brown finish has implications for the development of the black-brown bowls of the succeeding ceramic complex; these implications are explored in the discussion below.

As shown in Table 43, orange and brown slipped surfaces are the most common modes of surface finish in the Temazcalli bowls, together comprising close to two-thirds of all the sherds. After orange and brown, the three black and mottled brown modes discussed above, plus unslipped bowls account for most of the remaining examples. White slip and streaky black interior are rare modes; the latter is not represented in the quantified attribute file. Temazcalli bowls have the same composite surface treatment index as the Tilancingo bowls. Unslipped sherds often lack burnishing or polishing and have a low treatment index, while the mottled brown mode stands out as the most highly polished class. The other modes are very similar in the overall degree of surface treatment. When the surface finish modes are compared on the basis of paste, the mottled brown and black smudged classes are distinctive, while the other modes are relatively uniform. In paste color only the smudged black mode is distinct; seven of the eleven sherds have black paste (63.6%). The black paste is almost certainly due to the smudging process, rather than to simple reduction or lack of oxidation (see Shepard 1956:106). In terms of paste texture, the mottled brown bowls tend to have a finer paste than other bowls (four fine; three medium; compare Table 42), while the black smudged bowls tend to be coarser than most bowls (one fine; five medium; five coarse).

When surface finish is compared with vessel form, the most salient pattern is that rare forms (i.e. anything other than hemispherical or

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conical) usually occur only in the unslipped, orange and brown modes. The one exception is a miniature bowl (Form 520) which has a smudged surface.

Form.--While Temazcalli bowl forms show considerable uniformity (75% of all rims are either hemispherical or conical; see Table 48), there is more diversity than in the prior Tilancingo plain bowls. All of the bowl form subclasses with the exception of platos are represented, and in most cases more than one form within a subclass is present. The outcurved rims (309) are all quite small and could conceivably be olla rims. One incurved form (310) was found in Burial 1 (Figure 36,F); it is poorly made and is vertically asymmetrical. Hemispherical bowls, while less prevalent than in the Tilancingo complex, are still the most common subclass. An example from Burial 1 is illustrated in Figure 36,G; it shows a raised base, a rare bowl form mode which becomes more common in the following phase. Conical bowls represent 20 percent of all plain bowl rims and are much more common in the Temazcalli complex than in the Tilancingo complex. Five complete or nearly complete conical bowls are illustrated in Figure 37,A-E. The first three are all orange slipped bowls from Burial 1; one bowl has a flat base, another a raised base, and the third has a dimpled base. Figure 37,D shows a mottled brown bowl of the Temazcalli complex, while Figure 37,E presents a small bowl with a black slipped interior. Five unusual rims are present (Form 301; "odd"); of these rims, three are large enough to illustrate (Figure 37, F-H).

With the exception of the two raised bases and one dimple base (Figure 36,G; Figure 37,B,C), most bowl bases in this complex are flat. Ten support fragments (one solid and the rest hollow) are included with the plain bowls; eight of the supports have eroded surfaces, however, and

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TABLE 48

PLAIN BOWL FORMS AND FORM SUBCLASSES OF THE TEMAZCALLI COMPLEX

Subclass	N	%	Constituent forms	Eroded Bowls	
				N	Forms
1. Outcurved	4	3.8	309(4)	-	
2. Incurved	4	3.8	310(2) 311(2)	1	310
3. Hemispherical	60	57.1	315(60)	6	315
4. Conical	22	21.0	317(5) 319(15) 320(2)	2	319
5. Straight	2	1.9	322(1) 323(1)	-	
6. Everted	3	2.9	326(1) 327(1) 330(1)	1	331
7. Recurved	4	3.8	332(1) 339(3)	-	
8. Miniature	1	1.0	520(1)	-	
9. Other	6	4.8	301(6)	1	301
Plato	-	-	-	1	364
Non-fragmentary rims	106				
Fragmentary rims	4		300(2) 304(1) 306(1)		
Eroded rims	12				
Total Bowl Rims	122				

Figure 37. Ceramics of the Temazcalli Complex. A-C, orange slipped bowls, A (82-19, 317), B (82-17, 317), C (82-4, 317); D, mottled brown bowl (10-9, 317); E-F, bowls with black slipped interiors, E (14-30, 317), F (8-90, 301); G, eroded bowl (8-91, 301); H, orange slipped bowls (14-25, 301).

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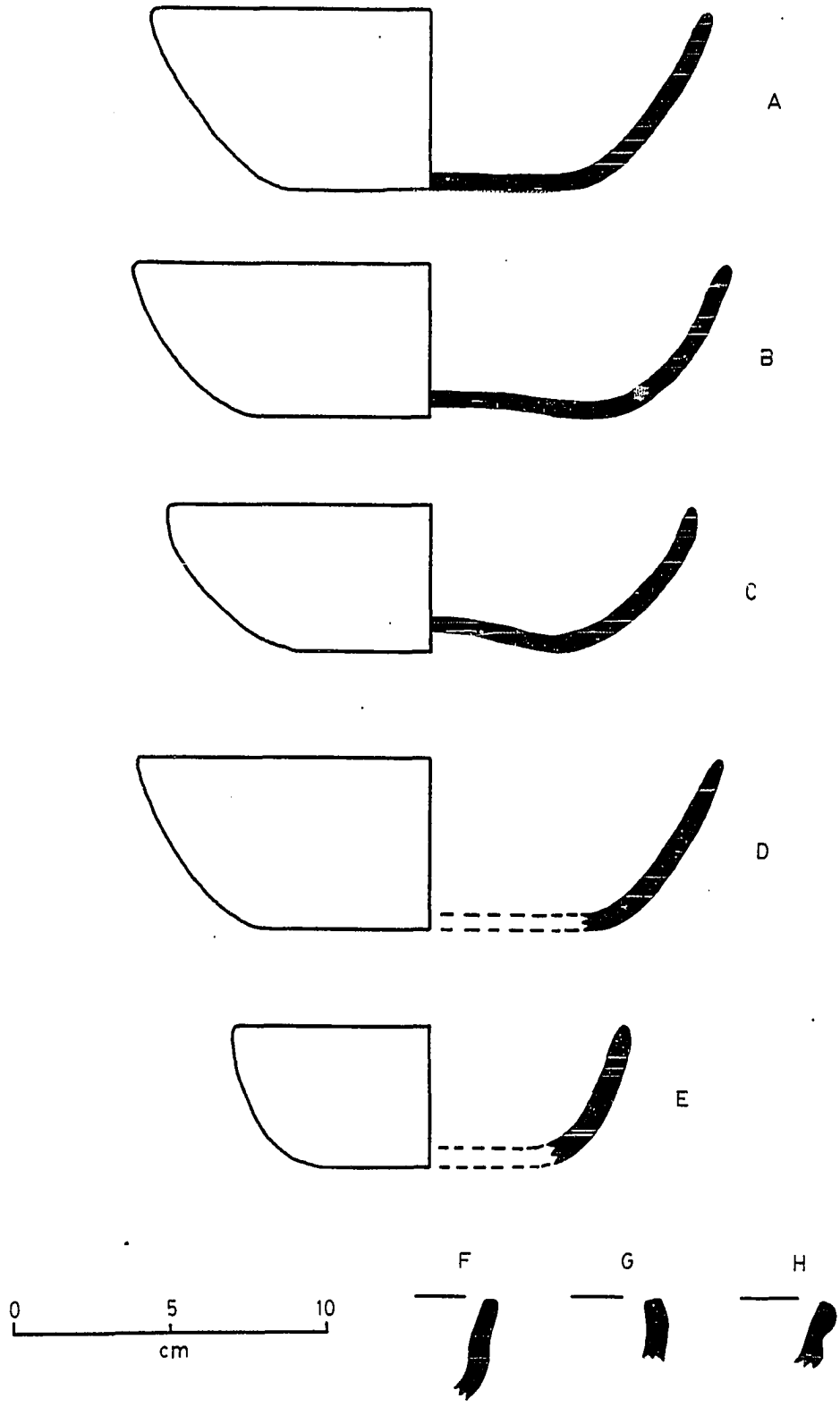

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probably come from decorated bowls. The other two supports are fragments without attached bodies (one is orange slipped, the other brown); these also could have come from decorated bowls. As yet, no plain bowls in the Temazcalli complex are known to have supports, while a number of the decorated forms have tripod supports. Temazcalli plain bowl diameters fall into three distinct size modes; these data are presented below in the summary of Temazcalli bowl forms.

Discussion.--The practice of deliberately smudging plainware bowls in order to achieve a new color of surface finish occurs for the first time in the Temazcalli ceramic complex. The fact that the color differences between the mottled brown finish and the black smudged finish are associated with differences in paste texture and degree of polishing indicates that smudging was used to achieve two distinct modes of finish. The mottled brown finish results from incomplete smudging of an orange slip; the paste of these bowls is never black. The black smudged finish is produced by complete smudging such that the entire vessel surface is black (some examples were incorrectly identified as black slipped); in most cases, the paste is completely blackened (see Shepard 1956:106). These two separate bowl "types" contrast with the situation in the following Early Cuauhnáhuac complex, in which the mottled brown and black smudged finishes are not distinguishable in paste, treatment, or form, and appear to represent color variations of a single ceramic "type." The Early Cuauhnáhuac black-brown bowls more closely resemble the mottled brown bowls than the black smudged bowls of the Temazcalli complex and most likely developed out of the mottled brown type.

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B-4 Polychrome Bowls (C.2; n=17)

While the Tlahuica polychrome style has only one manifestation on ollas (the "Tlahuica polychrome" ollas), there are a number of variations of the style found on the decorated bowls of Postclassic Morelos. All of these meet the basic criteria of the Tlahuica polychrome decoration (Black and Red on White colors; thin black lines as zone dividers; use of scrolls, interlocking S-motifs, and other standardized designs), but vary in terms of design layout and which motifs are emphasized, Seven large classes of Tlahuica polychrome bowls, labelled A through G, have been defined on the basis of these two latter characteristics. Two of the classes, D and F, may be considered as decorative types in themselves, while the rest are divided into constituent numbered types (e.g. A-1, A-2, etc.). The full classification of Tlahuica polychrome bowls is presented elsewhere (Smith n.d.); only the types found at Xochicalco are described here. The material found at Xochicalco includes types B-3 and B-4, as well as several additional types that were imported from the Cuernavaca area (see below).

Definition.--The B group of Tlahuica polychrome bowls is defined by the presence of a decorative field covering most or all of the exterior wall of the vessel. In all but a few examples, the exterior of the rim is decorated in red, usually in the form of a red band (ca. 1 centimeter wide), although red triangles and other motifs also occur. The B-4 type, which is the most widespread Tlahuica polychrome type both geographically and temporally, is defined by: (1) the presence of at least one set of thin black horizontal lines immediately beneath the rim; and (2) the division of the area under these lines into at least two adjacent zones through the use of some sort of vertical dividers. B-4 polychrome bowls are found

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in almost all areas of Morelos in the Late Postclassic period; their presence in the Temazcalli complex at Xochicalco represents the earliest known occurrence of the type. There are several differences between the Temazcalli specimens and later examples of this type; accordingly, descriptions of the chronological variants are separated by phase.

Paste.--Orange paste predominates over buff at a ratio of thirteen to three. Texture is variable, with five sherds of fine paste, seven of medium, and four of coarse paste. Nearly half of the sherds are fully oxidized (see Table 49).

Surface.--Exterior surfaces are completely covered with white slip or paint, which serves as a background for the black and red decoration. Forty percent of the decorated surfaces are polished, while sixty percent are burnished. Four different finishes are found on the interior surfaces of B-4 polychrome bowls: six examples are unslipped, seven have a black slip, two are streaky black slipped, and one is smudged. Surface treatment of the unslipped mode ranges from smoothed to polished, while the interior slipped surfaces are evenly divided between burnished and polished treatment.

Decoration.--Based upon the study of B-4 polychrome bowls from all parts of Morelos, I have isolated four variants corresponding to structural differences in the layout of the decorative field. These variants, labelled a through d, are illustrated in schematic form in Figure 38,A-D. Variant a is the simplest of the four, having a single horizontal field (between two sets of black lines) which is divided into zones or panels by vertical lines. Variant b has two horizontal fields; the top field is narrow and usually has connected scrolls or a wavy line,

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TABLE 49

PASTE MODES OF SELECTED TEMAZCALLI DECORATIVE CLASSES

Dimension	B-4 Polychrome		Guinda		Graphite Guinda[a]		Red-on-Buff		Eroded Decorated Bowls	
	N	%	N	%	N	%	N	%	N	%
Color										
Orange	13	81.3	30	25.9	2	15.4	6	60.0	5	31.3
Orange-Buff	-	-	16	13.8	1	7.7	1	10.0	1	6.3
Buff	3	18.7	65	56.0	8	61.5	2	20.0	9	56.3
Grey	-	-	1	0.9	1	7.7	-	-	1	6.3
Black	-	-	4	3.4	1	7.7	1	10.0	-	-
Texture										
Fine	5	31.3	84	72.4	12	92.3	1	10.0	8	50.0
Medium	7	43.8	32	27.6	1	7.7	6	60.0	7	43.8
Coarse	4	25.0	-	-	-	-	3	30.0	1	6.3
Oxidation[b]										
Complete	7	43.8	27	24.1	1	8.3	3	33.3	7	43.8
Partial	5	31.3	45	40.2	7	58.3	6	66.7	6	37.5
Slight	4	25.0	40	35.7	4	33.3	-	-	3	18.8
Number of Sherds	16		116		13		10		16	

Notes:

[a]This class includes five sherds from other phases in addition to the eight from the Temazcalli phase.

[b]Sherds whose paste color is black are not included in the counts for the oxidation dimension.

while the bottom field is structurally identical to the horizontal field of variant A. Variant c is like b, except that a panel containing a rectangular red zone extends up from the lower field to interrupt the top field. The final variant, d, has three horizontal fields. The bottom two fields are identical to those of variant c, while the top field is the narrow strip with scrolls or other continuous horizontal motifs as described for variant b. In all but one of the complete or partial vessels of the B-4 type that were studied, one of the lower panels consists of a large red rectangle, and the sequence of a red zone plus one or two other panels is repeated twice within the circumference of the vessel. The nature of the non-red panels and the motifs they may contain varies within all four variants (the presence of designs in two of the variants in Figure 38,A-D is arbitrary). Most examples of variants b, c, and d (in all complexes) have either small connected scrolls or else a thin wavy line in the narrow horizontal field, although a minority of vessels may exhibit more complex designs in this field. The only previous classification of design variation in B-4 polychrome bowls (Mason 1980:350f) consists of four types that vary according to the nature of the decoration in this narrow horizontal field. While such variation may or may not turn out to have cultural or temporal significance, the variants based upon the structural layout of designs as defined here represent a more fundamental level of choice in the decoration of bowls, and therefore may be assumed to have greater cultural significance (see Bunzel 1929:13-48; Friedrich 1970).

Four of the B-4 Polychrome bowls of the Temazcalli complex are large enough to discern something of their design layout. Two of these are Variant a, one is Variant c, and one could be either a or c. The only

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Figure 38. Ceramics of the Temazcalli Complex. A-D, B-4 Polychrome design variants a-d (schematic); E-I, B-4 Polychrome bowls, E, variant a (16-43, 322/334), F, variant c (8-157, 322), G-I, variant unknown, G (8-162), H (10-44, 322), I (10-49); J-M, Teopanzolco imports, J, type B-1 (82-15, 315), K, type B-1 (82-3, 317), L, type "A/B" (14-74, 315), M, type D (10-51, 315); N, Guinda bowl (14-51, 317).

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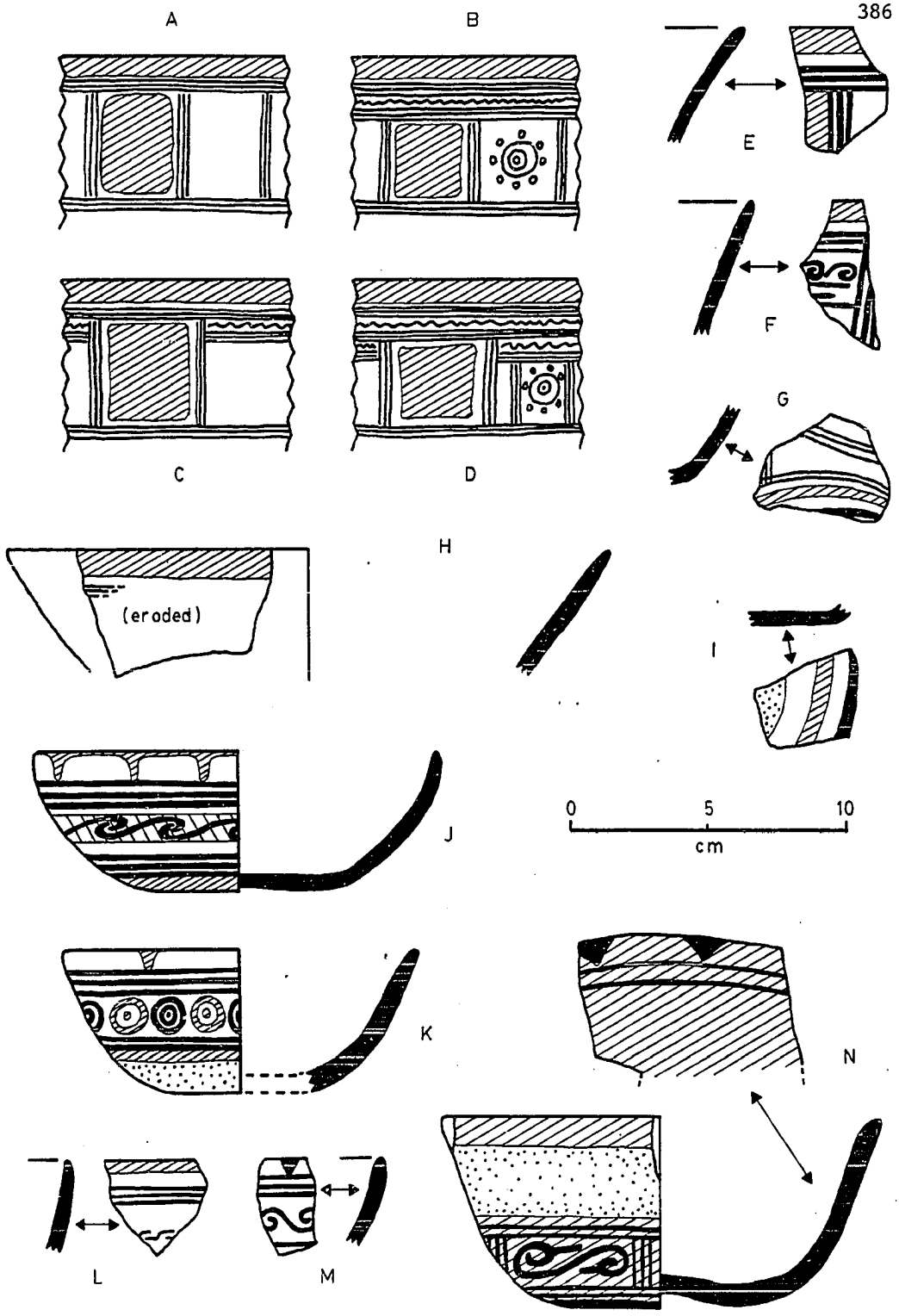

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Figure 39. Unusual B-4 Polychrome bowl of the Temazcalli Complex (82-2; 318).

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near-complete vessel of this type is an unusual example of Variant a recovered from Burial 1 (Figure 39). Although conforming to the definition of type B-4, this vessel differs from most other examples in several respects: (1) the red color used is more of a red-orange than the bright red normally found; (2) there is no rectangular red zone; (3) the row of interlocking S-motifs under the flower panel is unique; (4) the double flower motif is unusual (but not unique); and (5) the vessel form (318) is unusual in that it has a greater height to diameter ratio than other examples of B-4 Polychrome bowls. It is suggested below that this burial vessel may predate the other examples of B-4 Polychrome from Temazcalli deposits. A more typical, though fragmentary, example of Variant a is illustrated in Figure 38,E. The only clear example of Variant c is shown in Figure 38,F; this particular example differs from most cases of Variant c in later phases, where the scrolls in the narrow zone tend to be much smaller. Figure 38,G pictures a B-4 sherd with diagonal elements and particularly thin black lines; an eroded B-4 Polychrome bowl is also illustrated (Figure 38,H). Many if not most B-4 Polychrome bowls in all ceramic complexes exhibit decoration over part of the bowl base. The white foundation extends below the vessel wall, covering the outer 2 or 3 cm of the base, upon which are painted concentric circles of red and black. One example of such a painted base from the Temazcalli complex is shown in Figure 38,I. One feature of the Temazcalli B-4 rims not found in later examples is the presence of a red rim band on the interior surface in addition to the exterior rim band on two examples.

Form.--Eleven of the 16 B-4 Polychrome sherds are rims. One is hemispherical (Form 315); six are conical (1 Form 318; 5 Form 319); three

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are straight flaring (322) and one is either straight (322) or recurved (334). If this latter rim (Figure 38,E) is straight and not recurved, then Form 334 is limited to the B-4 bowls of the Early and Late Cuauhnáhuac complexes. The two diameter measurements available are 20 cm (see Figure 39) and 22 cm; vessel supports are never found in this class of decorated bowl.

Discussion.--In the present Postclassic chronology for the State of Morelos, the Temazcalli complex is coeval with the first part of the Teopanzolco complex. Therefore, the B-4 Polychrome type at Xochicalco must be seen as more or less contemporary with the many Tlahuica Polychrome bowl types of that complex. Nevertheless, stylistic considerations suggest that the B-4 pattern of design developed out of the A-1 and/or B-1 Polychrome types of the Teopanzolco complex (Smith n.d.), and thus may have originated somewhat later than the Teopanzolco types. This interpretation finds support in the fact that Burial 1 at Xochicalco included two B-1 Polychrome bowls (see below) plus the single most deviant example known of the B-4 class. All of the more standard B-4 sherds in the Temazcalli phase come from the refuse deposits. If Burial 1 occurred early in this phase, then the typical B-4 pattern would date later than its proposed B-1 source, and the unusual B-4 bowl from Burial 1 (Figure 39) may be seen as an early and perhaps experimental version of a subsequently highly standardized decorative type.

In the succeeding Late Preclassic period, B-4 Polychrome bowls are found in relatively high frequencies from all parts of western and central Morelos. Their presence in a Middle Postclassic time span, however, is limited to the 16 examples described here. In the largely contemporaneous

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Teopanzolco ceramic complex of the Cuernavaca area, there is a profusion of Tlahuica Polychrome bowl classes (ten distinct classes have been isolated--Smith n.d.), although no examples of the B-4 type have been recovered from Teopanzolco phase deposits in Cuernavaca. It may be suggested that during the Middle Postclassic period, the B-4 Polychrome type was a localized rural class of ceramics, in contrast to the more cosmopolitan and complex Tlahuica Polychrome types in the Cuernavaca area (seat of the Cuauhnáhuac polity). The interpretation that the A-1 and B-1 Polychrome classes of the Teopanzolco complex represent the inspiration for the development of the B-4 class is supported by the presence of at least 19 sherds of the Teopanzolco complex in Temazcalli deposits at Xochicalco; these imports include two B-1 bowls in Burial 1 and six sherds of type A-1.

Imports of the Teopanzolco Ceramic Complex (C.3; n=20)

The elaborate decorated ceramics of the Teopanzolco complex are the objects of a separate study (Smith n.d.), and only those types occurring in Temazcalli deposits are described briefly here. Preliminary descriptions and illustrations of ceramics from the Teopanzolco phase in the Cuernavaca area may be found in Vaillant and Vaillant (1934:86-94), Noguera and Piña Chán (1956/57), and Smith (1981a, 1981b).

Type A-1 (n=6).--Tlahuica Polychrome bowl class A-1 is defined by a white decorative zone covering only the top one-third or so of the exterior vessel wall. Decoration in the form of interlocking S-motifs, wavy lines, or other motifs is present in a continuous horizontal band between sets of parallel black lines. This is the most common decorative type of the Teopanzolco complex aside from the Guinda class. All of the

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examples at Xochicalco consist of small sherds recovered in refuse deposits.

Type B-1 (n=2).--This representative of the B group is distinguished by the presence of a single horizontal decorative field, unbroken by vertical dividers. Decoration within this field consists of black and/or red scrolls or circles, arranged in a horizontal band in the center of the field. In place of the red rim band, many examples exhibit red triangles or other motifs around the exterior rim. The two examples from the Temazcalli phase are both complete vessels from Burial 1; the first has a black slipped interior (Figure 38,J), and the second is orange slipped on the inside (Figure 38,K).

Type "A/B" (n=1).--A minor type of the Teopanzolco complex, this class exhibits decoration which appears to represent a compromise between types A-1 and B-1. The decorative field covers most (but not all) of the exterior bowl wall, similar to Type B-1, but the continuous band of interlocking S-motifs found in all examples is a characteristic of class A-1 and is not found in class B-1. The Xochicalco example is illustrated in Figure 38,L.

Type D (n=2).--This class consists of miniature vessels with decoration conforming to the B Group definition, but occurring on the interior of the vessel. One of the Temazcalli examples is shown in Figure 38,M.

Type G (n=2).--Polychrome Type G is defined by decoration that covers the interior surface of the vessel, which is divided into a central circular zone and four or six panels formed by dividers extending radially out from the circle's edge to the vessel rim. Neither of the two examples

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from Temazcalli contexts are large enough to illustrate.

Black-Rim Orange (n=6).--This class represents the only clear Teopanzolco import that is not a type of Tlahuica Polychrome. It consists of orange slipped bowls with a black exterior rim band. Many examples exhibit scrolls painted over the black in a fugitive white paint. None of the examples from Xochicalco were drawn.

Other (n=1).--In addition to the above nineteen examples, a polychrome bowl recovered in Burial 1 may tentatively be assigned to the Teopanzolco complex. This unusual hemispherical bowl has a black on red interior and an eroded polychrome (black and red on white) exterior. Although this color combination is more typical of the Toluca Valley polychromes, the designs appear to be closest to those on Tlahuica Polychrome Type G of the Teopanzolco complex, and the vessel form does not resemble Toluca Valley examples.

Discussion.--The above decorative classes were defined initially in the analysis of ceramics from Teopanzolco, and their identification at Xochicalco as imports was straightforward based upon numerical superiority at the former site.

Eroded Tlahuica Polychrome Bowls (C.4; n=5)

This class consists of eroded and fragmentary bowl sherds that exhibit characteristics of the Tlahuica Polychrome style, but cannot be assigned to a specific type. In the context of the Temazcalli phase, these sherds (which are all decorated on their exterior surfaces) could either be the local B-4 class, or else one of the Teopanzolco imports (A-1, B-1, or A/B).

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Guinda (C.5; n=116)

Definition.--See discussion under the Guinda class of the Tilancingo complex.

Paste.--As in all of the Morelos Guinda ceramics, buff paste predominates over orange. Most sherds have fine paste, and most are not fully oxidized (Table 49). Within each of the two paste colors, oxidation and texture are associated such that an oxidized fine orange paste type (n=12 of 30) and an incompletely oxidized fine buff paste type (n=50 of 65) stand out (with chi-square significance levels of .020 and .015 respectively). These paste types are only weakly associated with surface finish and vessel form, however. For example two pastes are only found with simple hemispherical or conical bowl forms; with the exception of one plato, all of the more complex serving vessel forms have pastes other than the two paste-types. Also, black slipped interiors are rare in the Guinda class, and they only occur on vessels of the oxidized orange paste-type. Beyond this, paste types and paste attributes are not significantly associated with surface or form attributes.

Surface.--The various combinations of interior and exterior surface finish found in the Temazcalli Guinda vessels are shown in Table 50. The most salient characteristic of the Guinda finish is that nearly all vessels are finished on the interior, but that less than half are finished on the exterior surface. All but one of the six sherds classified as unslipped on their interior surface are pitchers (Form 601), so the actual proportion of Guinda bowls with unslipped interiors is less than 1%. In addition to this one bowl, only the two sherds with black slipped interiors and possibly the black smudge example do not have a guinda finish on the interior (it

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TABLE 50

MODES OF SURFACE FINISH IN THE TEMAZCALLI GUINDA CLASS

Interior	Exterior						Total	
	unslipped	red	black/ red	bl & wh/ red	bl & wh & or/red	orange slip	N	%
unslipped	-	4	1	1	-	-	6	5.4
red	29	16	9	1	1	-	56	50.5
black/ red	29	3	-	-	-	1	33	27.9
bl & wh/ red	1	-	-	-	-	-	1	0.9
black slip	-	-	2	-	-	-	2	1.8
black smudge	-	-	1	-	-	-	1	0.9
grey smudge	-	2	4	5	-	-	11	9.9
Total N	59	25	17	7	1	1	110	
Total %	53.2	22.5	15.3	6.3	0.9	0.9		

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TABLE 51

GUINDA VESSEL FORMS AND FORM SUBCLASSES IN THE TEMAZCALLI COMPLEX

Subclass	N	%	Constituent forms
2. Incurved	1	2.0	311(1)
3. Hemispherical	30	61.2	315(22) 316(8)
4. Conical	9	18.4	317(4) 319(4) 320(1)
6. Everted	2	4.1	325(2)
8. Plato	2	4.1	362(1) 369(1)
10. Other	5	10.2	601(5)
Total non-fragmentary	49		
Non-fragmentary rims	44		
Diagnostic bodies	5		(form 601--pitcher)
Fragmentary rims	3		300(2) 306(1)
Total forms	52		

will be recalled that the grey smudge finish describes guinda finishes that have been smudged). Most of the Guinda bowls that have unslipped exterior surfaces have a 1 to 3 cm wide red band around the exterior of the rim; some vessels have red rims and red exterior bases, with an unslipped zone in between (Figure 38,N). Virtually all of the finished surfaces are polished, while the unslipped exteriors tend to be burnished.

Decoration.--The most common decorative pattern in the Temazcalli Guinda bowls consists of black triangles along the interior rim, below which run two or three horizontal black lines. This pattern is found in 13 of the 47 bowl rims (see Figure 38,N), and is sometimes accompanied by thick-lined scrolls or other motifs below the lines (Figure 40,B). All but one of the 13 rims so decorated have unslipped exteriors with red rim bands. This decorative pattern is a good chronological marker of the Temazcalli phase.

In addition to the interior black triangles and exterior red band, a thin black line along the tip is a common rim decoration (n=9); this is sometimes combined with the other two rim decoration patterns. The only other pattern of decoration that can presently be isolated consists of a wide black interior strip or doughnut running around the interior of bowl bases, with the central circular area left red (n=6); this pattern is also found in the Graphite Guinda class. In addition, common Tlahuica and/or central Mexican motifs such as scrolls, circles, and interlocking S-motifs are present. Two examples of Guinda decoration are illustrated in Figure 40,A,C; the second is a whole vessel from Burial 1.

Form.--Forty-seven Guinda bowl rims were recovered, and five body sherds could be assigned to the pitcher form. As shown in Table 51,

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Figure 40. Ceramics of the Temazcalli Complex. A-C, Guinda bowls, A (20-27, 315), B (14-52, 317), C (82-1, 315V); D-E, Morelos-Puebla Black-on-Orange, D (3-00, 332), E (16-51, 315); F-J, Incised Redware, F, Temazcalli (16-60), G, Temazcalli (16-59), H, Early Cuauhnáhuac (15-100), I, Late Cuauhnáhuac (3-59), J, incised motif from Teotenango, redrawn from Vargas (1975:262); K-L, Red-on-Buff bowls, K (8-166, 362), L (8-167, 336/367); M, red on orange bowl (14-72, 315).

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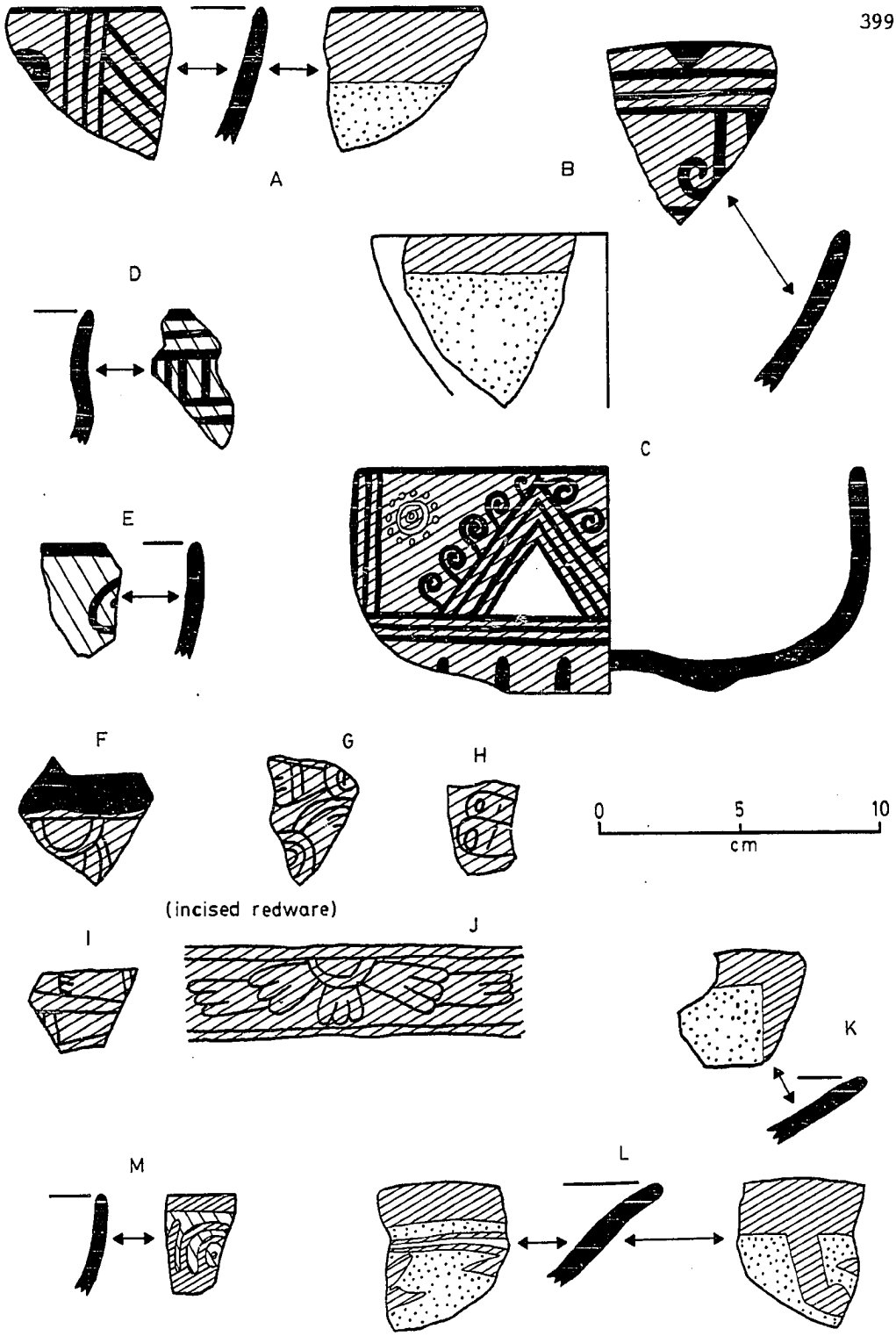

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Figure 41. Incised Guinda partial vessel from Temazcalli phase deposits.

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three-fourths of the vessels are simple hemispherical and conical bowls. The only unusual forms, aside from the pitchers, are the two platos and Form 325, which is present in the contemporaneous Teopanzolco and Tepozteco complexes but does not continue into the Cuauhnāhuac period. Form 316, a variant of the hemispherical subclass, is not found in any other bowl class. Five dimple bases were recovered (see Figure 40,C for one example), as was one solid support fragment (presumably but not necessarily matching one of the plato forms). Other than the previously noted fact that the two paste-types are found only in hemispherical and conical bowls, there are no consistent relationships between vessel form and attributes of paste or surface finish.

Discussion.--Guinda ceramics specifically dating to the Early Aztec period in the Basin of Mexico have been described from the Teotihuacan Valley (Parsons 1966:225), the Texcoco Region (Blanton and Parsons 1971: 298f) and the southern Basin of Mexico (Whalen and Parsons n.d.). Of these three groups of ceramics, the Temazcalli Guinda type most closely resembles the latter two. Two characteristics of the Hueoxtoc (Early Aztec) phase Guinda of the Teotihuacan Valley--a preponderance of recurved rim forms and a high proportion of relatively coarse paste (Parsons 1966:225)--are quite different from the Temazcalli examples. The simple bowl forms and incompletely oxidized fine buff paste characteristic of the Xochicalco Guinda are also found in the Texcoco and southern Basin descriptions. Similarly, smudged interiors are common in both the Temazcalli Guinda and that from the two latter regions (Parsons reports that polished black interiors--perhaps from smudging--are also common in the Early Aztec Guinda from the Teotihuacan Valley; 1966:225). Beyond this general level of description,

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few types or attributes of the Guinda class have been isolated that are limited to either the Early or Late Aztec periods. As Whalen and Parsons (n.d.) point out, the Guinda class "is less well described than Black-on-Orange. Consequently, less is known about its spatial and chronological variation." Nevertheless, two distinctive Guinda sub-types limited to the Early Aztec period have been described in the literature. The first, Graphite Guinda, begins at least as early as the start of the Early Aztec phase; this type is described separately below.

The second Early Aztec Guinda type has been called Incised Black-on-Red (Whalen and Parsons n.d.; Blanton and Parsons 1971:298) and White-on-Red Incised (O'Neill 1962:133) in its occurrences in the southern Basin, the Texcoco area and Chalco respectively; additional examples from Tenayuca, which probably represents its place of origin, are illustrated by Noguera (1935:Lámina XVI:1,2,3). Although no examples of this type were recovered from quantified Xochicalco deposits, a partial vessel was recovered from Capa II of Terrace 85 above Burial 1 (Figure 41). As discussed in Chapter 4, it is not clear whether these deposits consist of burial fill or occupation refuse above the burial, although the latter interpretation is more likely. If this is indeed the case, then the vessel shown in Figure 41 post-dates Burial 1 and may therefore pertain to a later portion of the Temazcalli phase. This is in line with the suggestions of Whalen and Parsons (n.d.) that Incised Black-on-Red "dates to a late phase of the Early Aztec period." This class, which is found in association with Aztec II Black-on-Orange at Tenayuca, Chalco, and Teopanzolco, is discussed further in Chapter 7. It is referred to as Incised Guinda in the present work.

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In summary, the Guinda class represents by far the largest class of decorated ceramics in the Temazcalli complex. Given its prevalence not only at Xochicalco, but in the contemporaneous Teopanzolco complex of Cuernavaca as well, it is probably safe to assume that most of these vessels were manufactured in Morelos. Similarities with Early Aztec Guinda of the Basin of Mexico most likely represent shared decorative ideals resulting from processes of trade and communication between the two areas. As would be expected on the basis of proximity, the Temazcalli Guinda more closely resembles that of the southern and central Basin of Mexico than the Guinda of the Teotihuacan Valley. Nevertheless, some of the Temazcalli Guinda vessels may represent imports from the Basin of Mexico; the Incised Guinda vessel shown in Figure 41 is the most likely candidate here. Similarly, the distinctive Graphite Guinda sherds at Xochicalco are almost certainly imported, but from the eastern Morelos/ southwestern Puebla area rather than from the Basin of Mexico.

Graphite Guinda (C.6; n=8)

Definition.--This decorative type consists of Guinda vessels which exhibit graphite black painting. Because many of these vessels have a distinctive pattern of incised vertical hook motifs on the exterior surface, one Guinda sherd with this trait but lacking graphite paint is also included. This association is recognized by O'Neill, who calls the type "Chalco Graphite Black/Red Incised" (1962:121ff). The following description is based upon all 13 Graphite Guinda sherds recovered at Xochicalco. Three of these are from Tilancingo deposits and two from Early Cuauhnáhuac levels. No potentially significant differences between these five sherds and the eight Temazcalli examples were noted; it is assumed that this

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uniformity is due to the homogeneous nature of the Graphite Guinda type through time, although it could be due to the small sample size and the fragmentary nature of the sherds.

Paste.--The paste of this type is very similar to the incompletely oxidized fine buff paste common in the Temazcalli Guinda type; eight of the sherds are buff in color, and all but one are fine textured and incompletely oxidized (Table 49).

Surface.--Three sherds have graphite black interiors without an underlying red slip, while the remainder of the examples have guinda interiors; half of the red interiors are painted with (graphite) black. One sherd has a grey smudge finish. On the exterior surface, three sherds are unslipped while the remainder have red slip. All finished surfaces are polished, while the unslipped exteriors are burnished or smoothed.

Decoration.--All five Graphite Guinda rim sherds have a graphite black rim band on the exterior surface. Apart from this, no distinct painted motifs are discernible, although several sherds appear to have a black circular band in their interior base, similar to that described for the Temazcalli Guinda bowls. Two sherds have the incised hook motifs on their exterior wall; one of these also shows the black rim decoration above the hooks.

Form.--Of the five rims, three are hemispherical bowls (Form 315), one is fragmentary (305), and one is a recurved form (332). No diameters are available. Three of the four sherds from bowl bases have a raised circle, 2-3 cm in diameter, in the center of the base. These vessels have flat exterior bases (i.e. this is not a dimple base), and the interior circle is well defined. It is elevated about 2-4 mm above the bowl base

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and is red in color, surrounded in two cases by graphite black (presumably circular) zones. One hollow support fragment with graphite paint was also recovered.

Discussion.--Graphite Guinda has been recovered in substantial numbers from excavations at Chalco (O'Neill 1962:121ff) and Tetla, Morelos (Norr n.d.). Unfortunately this type is not distinguished from other Guinda ceramics by Whalen and Parsons (n.d.), although they do note its existence in their collections. O'Neill found over 2000 examples of this type in his test pit at Chalco; it comprises from 0.2% to 10.3% of all ceramics in Early Aztec levels. It is associated in these levels with Aztec I Black-on-Orange, Chalco-Cholula Polychrome, and Texcoco Fabric Marked (O'Neill 1962:Table 2), although these three types extend ca. 75 cm deeper than the earliest Graphite Guinda sherds. The type is common in the Tetla Ceramic Complex of eastern Morelos as represented at Tetla, Las Pilas and Olintepec. At Tetla, 57 sherds were recovered from quantified contexts, comprising 9.6% of the decorated wares, and 0.4% of all sherds (Norr n.d.). Scattered examples have been reported from Teotenango in the Toluca Valley (Wanda Tommasi, personal communication) and Teopanzolco and Tepozteco in Morelos (Smith n.d.); in addition a number of complete vessels have been recovered from an unknown context in the vicinity of Izucar, Puebla (these are in the collection of the Centro Regional Morelos-Guerrero of the Instituto Nacional de Antropología e Historia in Cuernevaca, where they have accession numbers 10-135789 and 10-135776). O'Neill (1962:288) also mentions examples of Graphite Guinda from Cholula which are now in the collections of the American Museum of Natural History. A Graphite Guinda pitcher from Epatlan, Puebla is on

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exhibit at the Museo Rufino Tamayo in the city of Oaxaca, Oaxaca; several similar vessels without provenience information are on exhibit in the Museo Cuauhnáhuac in the Palacio de Cortés in Cuernavaca. The characteristic incised hook motif is found as far south as the Tehuacan Valley in the Teotitlan Incised type of the Early Venta Salada phase (MacNeish, Peterson and Flannery 1970:205), although it is not associated there with graphite painting.

Wanda Tommasi (personal communication) has suggested that Graphite Guinda ceramics originate in the Izucar region of Puebla, based upon the vessels mentioned above and upon other unpublished reports of finds in that area. However, given the prevalence of the type at Chalco and Tetla, a broader zone of origin extending from Chalco through eastern Morelos to Izucar (and perhaps beyond) is more likely. Based upon the Early Aztec context of the type at Chalco and the Tetla phase context at the site of that name, a Middle Postclassic time frame is clearly indicated. This makes sense at Xochicalco, where both the Tilancingo and Temazcalli complexes are contemporaneous with at least part of the Tetla phase. The two sherds from Early Cuauhnáhuac levels suggest that the type continues into the Late Postclassic period, although they could reflect some mixing of earlier materials. The chronological and spatial distribution of Graphite Guinda in its hypothesized zone of origin is duplicated by the Morelos-Puebla Black-on-Orange class, which is described next.

Morelos-Puebla Black-on-Orange (C.7; n=7)

Definition.--This type consists of bowls decorated in black on orange with designs and motifs similar to those of the well described Aztec I or Culhuacan Black-on-Orange type of the southern Basin of Mexico

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(see Séjourné 1970; Whalen and Parsons n.d.; O'Neill 1962:85ff). It is differentiated from the Basin of Mexico type by the fact that the vessels are made from local clay; the paste of these sherds is a medium textured orange paste of medium hardness, quite distinct from the fine, hard Aztec orange paste. This description includes one Morelos-Puebla Black-on-Orange sherd from Tilancingo deposits and one from Late Cuauhnáhuac deposits in addition to the seven Temazcalli examples. One of the Temazcalli examples consists of a stamped base and was included, in spite of its lack of black decoration, because of the prevalence of stamped bases on this and only this type elsewhere in Morelos. Two fragmentary black on orange sherds are also included although their designs could only partially be discerned.

Description.--All nine sherds have orange paste; three are fine textured, four have medium texture, and two are coarse. Seven are fully oxidized while two are partially oxidized. All sherds appear to have burnished orange slipped interiors, and all but two have similar interior surfaces (one has a polished black interior, and the stamped base is unslipped). Five examples are decorated on the interior, two on the exterior, and two on both surfaces. All painted designs conform to the Aztec I style of Culhuacan (Séjourné 1970); the two most complete sherds are illustrated in Figure 40,D,E. In addition to these two rims (Forms 332 and 315), also present is an outcurved form (308) and a direct rim that cannot be oriented.

Discussion.--This type is identical to the Aztec I Black-on-Orange type from Culhuacan and the southern Basin of Mexico in both painted decoration and vessel form, but differs in paste. Whereas Aztec orange paste is relatively fine and quite hard, these sherds tend to have medium textured

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paste which is never as hard as the Basin of Mexico variety. The "laminated" layering of pink and orange colors often visible in Aztec orange paste is never present in the Morelos-Puebla type. Another difference between the two groups is that the Morelos examples are painted on a slipped surface, while the Aztec I designs are painted directly onto the unslipped orange surface (Sanders, Parsons and Santley 1979:468; Whalen and Parsons n.d.). The nine sherds of this type recovered at Xochicalco are virtually identical to the Black-on-Orange type from Tetla (Norr n.d.) and Tepozteco (Smith n.d.) in terms of paste, form and decoration. Vessels of similar form with similar decoration (but unknown paste) have been recovered from other parts of eastern Morelos and southwestern Puebla as well. I have examined such vessels from Las Pilas and Olintepec, Morelos, and from Izucar, Puebla (Smith n.d.), while Muller (1978a:186ff) illustrates several of these vessels from the Cholulteca II phase (A.D. 900-1325) at Cholula; on page 186, she labels one of these vessels "negro/crema del Golfo." This kind of bowl has been found in substantial numbers as far south as the Valley of Oaxaca, where Caso (1969:Lámina II) illustrates 20 examples from Tomb 7 at Monte Alban.

All of these black on orange vessels are clearly part of a single decorative style which has a minimum of two centers of manufacture. Given the prevalence of this type of pottery in eastern Morelos and southwestern Puebla, I am proposing "Morelos-Puebla Black-on-Orange" as a suitable name to distinguish the examples without Aztec paste from the previously defined Aztec I Black-on-Orange type. The temporal distribution of Morelos-Puebla Black-on-Orange parallels that of Graphite Guinda in its association with the Middle Postclassic Tetla and Tepozteco complexes and its appearance in

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the Cholulteca II phase at Cholula. The one example from the Late Cuauhnáhuac deposits probably represents an earlier sherd that was incorporated into later refuse.

It seems likely that both the Guinda and black on orange decorative types have their origin somewhere in the eastern Morelos/southwestern Puebla area. They occur in this region at least as early as in the Basin of Mexico, and a number of attributes characteristic of Early Aztec ceramics (such as stamped bases, incised hook motifs, stepped slab supports) occur in the Early Venta Salada phase at Tehuacan (MacNeish et al. 1970: 177-210), which largely predates the Early Aztec period. The Late Venta Salada Coxcatlan Black-on-Orange type (MacNeish et al. 1970:220-222) is closely related to the Morelos-Puebla Black-on-Orange type, and appears to have developed out of the Early Venta Salada Coxcatlan Red-on-Orange type (pp. 199-203); this latter type may therefore hold the key to the origin of the Aztec I and Morelos-Puebla Black-on-Orange types. This is an area where more work is needed, particularly in the further refinement of the Tehuacan Valley chronology. Until these relationships are better understood, it is assumed for the time being that the origins of both the Graphite Guinda and the Morelos-Puebla Black-on-Orange classes are to be found somewhere in the eastern Morelos/southwestern Puebla area.

Aztec I Black-on-Orange (C.8; n=1)

One sherd of this type with the characteristic Aztec orange paste was recovered in Temazcalli levels at Xochicalco. The only other clear examples of Aztec I Black-on-Orange ceramics from Morelos that I know of consist of a few sherds from the Tepozteco ceramic complex (Smith n.d.).

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It is possible that some of the complete vessels from eastern Morelos with similar decoration are Basin of Mexico imports and not examples of local Morelos-Puebla Black-on-Orange; I think that this is unlikely, however.

Chalco-Cholula Polychrome (C.9; n=1)

One sherd of this type was recovered in Temazcalli phase deposits, and two were found in Early Cuauhnáhuac levels. These sherds have black and red designs on a background consisting of an orange slip or paint applied over a white undercoat. They correspond to either the "Chalco Polychrome" type described by O'Neill (1962:66-81) and/or Noguera's "polícroma laca" (1954:138ff) from Cholula. The relationship between the Chalco and Cholula polychrome types has yet to be worked out (see O'Neill 1962:76-81 for discussion), and the presence of chronological change within either type has not been established. Chalco Polychrome appears to date from both the Early and Late Aztec periods (O'Neill 1962:Table 2), while the temporal span of the Cholula type is a subject of debate. Estimates as far apart as A.D. 800 and 1325 have been proposed in the literature for the inception of Cholula Polychrome, but no definitive evidence has been put forward for any of the dates (see Smith and Heath-Smith 1980:36f for a discussion of this problem). The only conclusions that can be drawn are that (1) the Chalco and Cholula polychrome types are very similar and cannot be easily distinguished; and (2) both have a life span covering at least the Middle and Late Postclassic periods. The Xochicalco examples date to these periods, and may have been imported from either area or from elsewhere in the Puebla, Tlaxcala, eastern Morelos, or southern Basin of Mexico regions.

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Toluca Red-on-White (C.10; n=26)

This type is described under the Tilancingo complex.

Wavy Line Red-on-Cream (C.11; n=15)

This type is described under the Tilancingo complex.

Incised Redware (C.12; n=2)

Definition and Description.--This type is defined by the presence of curvilinear incising on a red background, executed on the walls of bowls. In addition to the two examples from Temazcalli contexts, one sherd of Incised Redware was recovered from each of the two succeeding phases. Because of the basic similarity of the four examples, they are all described here. Each one is illustrated (Figure 40,F-I), and their respective phase is given in the captions. Two of the sherds have orange paste, one is buff, and one is black; they are all of medium texture. All four examples have incisions on a polished guinda-like red exterior surface; only one (Early Cuauhnáhuac) has a red interior, with the remaining sherds unslipped on the inside. All examples are body sherds, and thus vessel form is not discernible. The designs appear to represent the tips of flower petals or else insect wings.

Discussion.--The only published examples of this type are two vessels from Teotenango illustrated by Vargas (1975:262), who calls them "Rojo Guinda Inciso." Both of these vessels have hollow tripod supports. One is incised on the interior, the other on the exterior vessel walls. The interior incised design on one of the vessels is quite similar to the Xochicalco fragments, and is illustrated here in Figure 40,J. Vargas dates these vessels to his final Prehispanic period, Phase "5 Muerte," but his

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chronological scheme is open to question (see discussion in Chapter 7). Four sherds of this type were recovered in Malinalco by Galván, who calls them "Rojo Inciso" (1974/75:75); they appear to date to his Phase 5 or 6 (see his Cuadros 1 and 2). Wanda Tommasi suggests that this type has an origin in the Valle de Bravo, north of the Toluca Valley (personal communication), but its chronology there (or at Teotenango) is not known.

Red-on-Buff (C.13; n=10)

Definition and Description.--This class consists of any bowls decorated in red on buff that do not fit in the Wavy Line Red-on-Cream type nor in any of the red on buff types characteristic of the Postclassic Toluca Valley (Tommasi's 1978 Type A). Sherds decorated in red paint on an unslipped orange surface are also included in this class. Most of the sherds have a medium texture orange paste, and most are not fully oxidized (Table 49). All ten examples are decorated on the interior surface, and only one has exterior decoration as well. Seven are red on a buff colored surface (sherds with orange paste often have a buff colored surface), two are red on an orange colored surface, and one appears to have a buff or cream colored slip upon which the red is applied. This latter example is polished, while all of the other decorated surfaces are burnished; unslipped unpainted exteriors range from smoothed to burnished in their treatment. The only examples large enough to discern much of the design are illustrated in Figure 40,K,L. Both interior surfaces have a wide rim band, with further decoration underneath; the single example with exterior decoration also has a wide rim band with the bold designs below. The illustrated rims represent Form 362 and an unusual form (closest to 336 or 367); one other

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fragmentary form (300) is also included.

Discussion.--While it is possible that some of the examples of Red-on-Buff bowls may represent fragments of Wavy Line Red-on-Cream bowls or Toluca Valley types, at least half of the sherds (including the two illustrated examples) are quite distinct from these or other previously defined types. The orange paste characteristic of this class differs from the buff paste common to the above mentioned types, and the vessel forms are distinctive as well. Closer relationships may perhaps be found with the Teopanzolco and/or Tepozteco Ceramic Complexes, both of which exhibit a small number of red on buff bowls and both of which utilize a higher proportion of orange paste than the Xochicalco complexes. It is entirely possible that this class represents a distinctive locally made decorative type that is just not common in the El Puerto or Terrace 85 excavations. A number of eroded red on buff bowls with non-everted rims were recovered in the Rio Chalma reconnaissance; these are somewhat distinct from the Wavy Line Red-on-Cream examples and may represent further examples of this decorative class.

Red-on-Orange (C.14; n=1)

One rim sherd painted with red designs on a fugitive orange slip was recovered. The painting is on the exterior surface (Figure 40,M), and the interior shows a polished and smudged surface. The paste is fine textured buff, barely oxidized. No comparable decorated ceramics have been located in the published literature. A "red-on-orange" type is described from Coatlan Viejo by Mason (1980:89), but represents ollas decorated in red painting on a cream to yellowish cream slip (see his Figures 51,52),

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bearing no relationship to the present class.

Eroded Decorated Bowls (C.15; n=16)

These sixteen sherds exhibit some traces of painted decoration, but are sufficiently eroded or fragmentary to preclude assignment to a specific decorative class; neither could they be classed as eroded Tlahuica Polychrome bowls. Paste characteristics of this class are listed in Table 49; ten rims are present, with hemispherical (Form 315:5), conical (319:2), recurved (337:1), and fragmentary (306:2) forms represented. The most common color patterns visible are red on white (n=7) and black on white (n=2); these sherds most likely pertain to a Tlahuica Polychrome type or to a Toluca Valley polychrome class. The remaining eroded sherds have either undetermined decoration on a white background or else decoration on an orange slip.

Serving Vessels: Summary of Forms

Locally made bowls of the Temazcalli complex exhibit a greater variety of form than those of the earlier Tilancingo complex. In part this is due to the larger sample size available (240 bowl rims compared to 61 Tilancingo bowl rims), but there are also significant additions to the basic repertoire of forms used. Hemispherical bowls are still the most common subclass, but their frequency among local bowls drops from 71.8% to 52% (Table 52). Conical bowls show a dramatic increase in popularity, from 5.1% (of local bowls) to 20.9% in the present phase; these may be seen as replacing the lost proportion of hemispherical bowls. Several significant associations may be noted for individual local bowl forms. As in the Tilancingo phase, Form 316 is limited to use in the Guinda

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TABLE 52

BOWL FORMS BY DECORATIVE CLASS, TEMAZCALLI COMPLEX

Form Subclass	Form	LOCAL						IMPORTED						Eroded Bowls	TOTAL
		C.1 Plain	C.2 B-4	C.5 Guinda	C.13 Red/Buff	C.14 Red/Orange	C.15 Eroded Decorated	C.3 Teopanzolco	C.6 Graphite Guinda	C.7 Morelos-Puebla Black-on-Orange	C.10 Toluca Red-on-White	C.11 Wavy Line Red-on-Cream			
OUTCURVED	308									1					5
	309	4													
INCURVED	310	2												1	6
	311	2		1											
HEMI-SPHERICAL	315	60	1	22		1	5	11	2	1	5			6	122
	316			8											
CONICAL	317	5		4				1							46
	318		1												
	319	15	5	4			2				3	1		2	
	320	2		1											
STRAIGHT	322	1	4												6
	323	1													
EVERTED	325			2											15
	326	1													
	327	1										9			
	330	1													
	331													1	

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TABLE 52 (continued)

Form Subclass	Form	LOCAL						IMPORTED						Eroded Bowls	TOTAL
		C.1 Plain	C.2 B-4	C.5 Guinda	C.13 Red/Buff	C.14 Red/Orange	C.15 Eroded Decorated	C.3 Teopanzolco	C.6 Graphite Guinda	C.7 Morelos-Puebla Black-on-Orange	C.10 Toluca Red-on-White	C.11 Wavy Line Red-on-Cream			
RECURVED	332	1							1						
	336										1				
	337						1								7
	339	3													
PLATO	362			1	1						1				
	364													1	6
	367				1?										
	369			1											
MINIATURE	520	1													1
OTHER	301	6									1			1	
	601			5											13
FRAGMENTARY	300	2		2	1					1					
	304	1													
	305										2				13
	306	1		1			2								
TOTAL		110	11	52[b]	3	1	10	12	3	3	13[a]	10		12	240

Notes: [a]This column includes two rims from unquantified levels (forms 336 and 364).

[b]This column includes five body sherds diagnostic of form 601.

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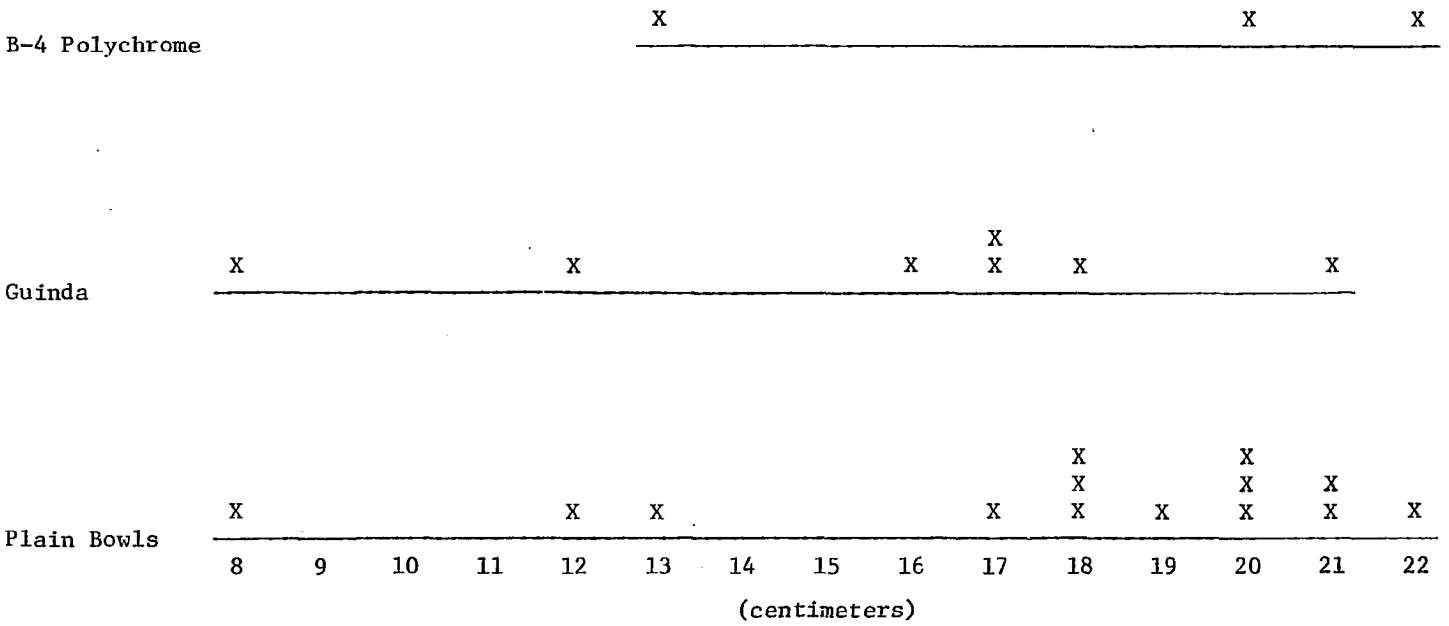
TABLE 53

BOWL RIM DIAMETERS OF THE TEMAZCALLI COMPLEX



class, and platos continue to be found on decorated but not plain bowls. Form 339, a distinctive recurved bowl rim, is found only on plain bowls. A new form, the miniature bowl with tripod supports is found in the plain bowls; this form becomes more common in later phases. Straight flaring forms are present in local bowls for the first time, and four of the six examples occur on B-4 Polychromes. A specialized form, the pitcher, is found among the Guinda sherds.

Whereas the Tilancingo complex showed an imbalance between local and imported bowls in terms of the hemispherical and conical forms, the two groups of bowls are much closer in their proportions of hemispherical and conical forms in the Temazcalli complex. It is interesting, however, that most of the imported hemispherical forms are from Teopanzolco, a related "Tlahuica" complex (see Chapter 7), rather than from other regions. Everted rim forms again tend to be found primarily on imported bowls, exclusively of the Wavy Line Red-on-Cream type in this phase.

A far greater number of diameter measurements are available for the Temazcalli bowls (n=24). These figures, which represent locally made classes exclusively, are plotted in Table 53. Plain bowls exhibit three distinct modes of size: 8 cm (miniatures), 12-13 cm and 19-20 cm. The "dip" in the distribution at 19 cm is probably due to sampling error and thus would not signal the existence of two modes on either side of this measurement. The B-4 Polychrome type exhibits the two larger size modes. The Guinda diameters, however, could indicate the existence of four size modes. The bottom two Guinda diameters duplicate the plain bowl sizes, while the larger Guinda bowls have either one or two modes; more examples are needed before this issue can be decided.

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In summary, the Temazcalli complex contains a greater variety of bowl forms than does the prior Tilancingo complex. Although a strong emphasis upon simple hemispherical and conical bowls is maintained, the relative proportion of these two form subclasses differs greatly in the two complexes. Many new forms are present, including miniature bowls, pitchers, straight flaring bowls, and fragments of outcurving bowls. Bowl diameters exhibit clear multimodality, with at least three modes; the largest of these may conceal more than one overlapping size mode, however.

Special Purpose Vessels and Other Ceramic Artifacts (D)

Texcoco Fabric Marked (D.1; n=5)

See the discussion under the Tilancingo complex.

Sahumadors (D.2; n=4)

The Temazcalli sahumadors are similar to those of the Tilancingo phase insofar as form and other characteristics can be determined. All four examples are quite small pieces.

Other Incensarios (D.3; n=27)

This class consists of fragments of Postclassic incensarios similar to those illustrated by Séjourné (1970:Figures 40-41) from Culhuacan; see also O'Neill (1962:149). Although these sherds were not subjected to the attribute analysis, most of them have coarse buff paste whose surfaces are either unslipped and rough or else have a thick white covering which may be a slip. Vessel walls are thick and forms could not be determined, although several large flanges are present. Three examples exhibit very deep coarse incising identical to that illustrated by Séjourné (1970:

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Figure 39); O'Neill (1962:152ff) calls these "Rough and Rough Scored."

Spindle Whorls (D.4; n=13)

Temazcalli phase refuse deposits yielded five spindle whorls, while seven were recovered from Burial 1 and one additional example comes from an unquantified Temazcalli level. Postclassic spindle whorls of Morelos are very similar to those from the Late Aztec period of the Basin of Mexico in two important respects: first, the basic forms are quite similar; and second, the clear bimodal distributions of whorl size and weight are present in Morelos as well as in the Basin of Mexico (see Parsons 1972a). Because of these similarities, Parsons' interpretation of the size difference as due to function--smaller whorls were used to spin cotton and larger ones for maguey--is valid for Morelos as well. In the Temazcalli phase, three of the seven whorls from refuse deposits represent the large maguey variety, while the remainder (including those from Burial 1) represent the small cotton spinning variety. Further data and interpretations concerning the Postclassic spindle whorls from Morelos may be found in Smith (n.d.).

Figurines (D.5; n=2)

Two figurine fragments were recovered from Temazcalli refuse deposits. Although not large enough to determine their full form or size, they appear to resemble the "Aztec" figures of the Early and Late Aztec period in the Basin of Mexico (Parsons 1972b) more than other published central Mexican varieties.

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Non-Postclassic Sherds (E; n=7)

A total of seven Phase G sherds were recovered from Temazcalli phase deposits; their presence results from the redeposition of earlier material.

The Early Cuauhnáhuac Ceramic Complex

Quantified deposits dating to the Early Cuauhnáhuac phase include units 5, 6, 7, 15, and 18; a total of 2193 sherds were recovered from these levels. Descriptive classes for the Early Cuauhnáhuac complex are shown in Table 54.

Cooking Vessels (A)

Comals (A.1; n=49)

Paste.--Orange paste is more common than the buff variety in Early Cuauhnáhuac comals, in contrast to the previous phase, where the reverse is true. Medium texture predominates (71.4%), nearly all examples exhibit "hard" paste, and most sherds are fully oxidized (see Table 55). The greater percentage of sherds at each of these modal values (medium texture; hard paste; full oxidation) suggests that the Early Cuauhnáhuac comals have a more standardized paste than their Temazcalli predecessors. One cluster of comals stand out as having fine, hard buff paste (n=8), but these examples do not exhibit any special association with surface or form dimensions.

Surface.--Comal surface finish is divided more or less evenly among the unslipped, orange slip, brown slip, and black slip modes (Table 56). There is some discrepancy in the relative mode frequencies between comal

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TABLE 54

DESCRIPTIVE CLASSES FOR THE EARLY CUAUHNAHUAC CERAMIC COMPLEX

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	A. Cooking Vessels				
A.1	Comal	49	49	-	150
A.2	Basin	5	5	-	23
A.3	Plain Olla	61	38	23	1143
	B. Storage/Transport Vessels				
B.1	Plain Olla (see Class A.3)				
B.2	Tlahuica Polychrome Olla	3	1	2	-
B.3	Red-on-Buff Olla	2	-	2	-
B.4	Miscellaneous Decorated Olla	13	-	13	-
	(total decorated ollas)	18	1	17	-
	C. Serving Vessels				
C.1	Plain Bowl	150	140 (11)[b]	10	410
C.2	B-3 Polychrome (Tlahuica)	2	2 (2)	-	-
C.3	B-4 Polychrome (Tlahuica)	36	17	19	-
C.4	Teopanzolco Imports	15	10 (1)	5	-
C.5	Eroded Tlahuica Polychrome	2	-	2	-
C.6	Guinda	52	21 (2)	31	-
C.7	Graphite Guinda	2	1	1	-
C.8	Chalco-Cholula Polychrome	-	-	-	2

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TABLE 54 (continued)

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
C. 9	Malinalco Polychrome	5	4	1	-
C.10	Aztec III Black-on-Orange	-	-	-	12
C.11	Incised Redware	1	-	1	-
C.12	Red-on-Buff	2	-	2	-
C.13	Eroded Decorated Bowls	13	10	3	-
	(total decorated bowls)	130	65	65	14
	D. Special Purpose Vessels and Other Ceramic Artifacts				
D.1	Texcoco Fabric Marked	-	-	-	6
D.2	Texcoco Molded/Texcoco Filleted	-	-	-	6
D.3	Sahumadors	-	-	-	10
D.4	Deeply Incised Incensarios	-	-	-	3
D.5	Spindle Whorls	-	-	-	8
D.6	Figurines	-	-	-	2
	E. Non-Postclassic Sherds				
E.	Non-Postclassic Sherds	-	-	-	5
TOTAL COUNTS (Total sherds: 2193)		413	296	117	1780

Notes:

[a]This category represents sherds from quantified levels that were sorted and studied in a preliminary fashion, but not subjected to detailed attribute analysis.

[b]Figures in parentheses represent the number of vessels from burials or other special deposits included in the rims category.

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TABLE 55

PLAINWARE PASTE MODES OF THE EARLY CUAUHNAHUAC COMPLEX

Dimension	Comals		Basins		Ollas		Bowls	
	N	%	N	%	N	%	N	%
Color								
1. Orange	28	57.1	3	60.0	22	41.5	89	60.5
2. Orange-Buff	-	-	1	20.0	-	-	1	0.7
3. Buff	20	40.8	1	20.0	26	49.1	42	28.6
4. Brown	-	-	-	-	-	-	1	0.7
5. Grey	1	2.0	-	-	2	3.8	8	5.4
6. Black	-	-	-	-	3	5.7	6	4.1
Texture								
1. Very Fine	-	-	-	-	-	-	1	0.7
2. Fine	9	18.4	-	-	4	7.5	50	34.0
3. Medium	35	71.4	-	-	30	56.6	81	55.1
4. Coarse	5	10.2	5	100.0	18	34.0	15	10.2
5. Very Coarse	-	-	-	-	1	1.9	-	-
Hardness								
1. Normal	6	12.2	4	80.0	31	58.5	127	87.0
2. Hard	43	87.8	1	20.0	21	39.6	18	12.3
3. Soft	-	-	-	-	1	1.9	1	0.7
Oxidation[a]								
1. Complete	35	71.4	1	20.0	30	60.0	73	52.1
2. Partial	12	24.5	4	80.0	17	34.0	47	33.6
3. Slight	2	4.1	-	-	3	6.0	20	14.3
Number of Sherds	49		5		53		147	

Note: [a]Sherds whose paste color is black are not included in the counts for the oxidation dimension.

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TABLE 56

PLAINWARE SLIP MODES OF THE EARLY CUAUHNAHUAC COMPLEX

Mode	Rims + Appendages		Total Sherds[a]		Burial Vessels[b]	Surface Treatment Index		
	N	%	N	%		Composite[c]	Int.	Ext.
COMAL (total)	49		199					
non-eroded	47	100.0	197	100.0		6.4		
1. unslipped	11	23.4	54	27.4		4.2		
2. orange slip	14	29.8	50	25.4		7.0		
3. brown	18	38.3	50	25.4		7.0		
4. black slip	3	6.4	42	21.3		7.0		
5. streaky black slip	1	2.1	1	0.5		8.0		
BASIN (total)	5	100.0	28	100.0		3.9	4.0	3.8
1. unslipped	2	40.0	7	25.0		2.8	3.5	2.0
2. orange slip	2	40.0	20	71.4		6.0	6.5	5.0
3. white slip	1	20.0	1	3.6		-	-	-
OLLA (total)	61		1204					
non-eroded	60	100.0	1150	100.0		4.8		
1. unslipped	26	43.3	296	25.7		3.0		
2. orange slip	13	21.7	307	26.7		5.9		
3. brown slip	16	26.7	444	38.6		6.6		
4. black slip	2	3.3	41	3.6		8.0		
5. black smudge	-	-	40	3.5		-		
6. white slip	3	5.0	22	1.9		3.0		

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TABLE 56 (continued)

		Rims + Appendages		Total Sherds[a]		Burial Vessels[b]	Surface Treatment Index		
		N	%	N	%		Composite[c]	Int.	Ext.
BOWL	(total)	150		560					
	non-eroded	141	100.0	549	100.0		7.0	7.2	6.7
1.	unslipped	15	10.6	61	11.1		3.4	3.6	3.1
2.	orange slip	62	44.0	295	53.7	1	7.4	7.5	7.2
3.	brown slip	19	13.5	77	14.0		7.2	7.7	6.6
4.	black slip interior	3	2.1	22	4.0		6.3	8.0	4.5
5.	brown-black slip	38	27.0	76	13.8	10	7.9	7.9	7.8
6.	white slip	4	2.8	5	0.9		6.2	6.5	5.8
7.	streaky black interior	-	-	2	0.4				
8.	other	-	-	12	2.2				

Notes:

[a]Total sherds includes body sherds not subjected to attribute analysis in addition to the rims and appendages.

[b]This column indicates the number of vessels from burials or other special deposits included in each mode.

[c]The composite surface treatment index is the average of the interior and exterior values (for the bowls and basins).

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TABLE 57

EARLY CUAUHNAHUAC COMAL FORMS AND FORM SUBCLASSES

Subclass	N	%	Constituent Forms
I. COMAL ELEVATION	(45)[a]	100.0	
1. flat	8	17.8	404(6) 410(1) 416(1)[b]
2.	13	28.9	405(5) 414(5) 417(2) 445(1)
3.	20	44.4	406(4) 411(5) 428(1) 439(3) 440(1) 443(2) 447(3) 448(1)
4. high	4	8.9	423(1) 431(1) 433(2)
- other forms	4	-	400(4)
Elevation index (mean): 2.44			
II. COMAL RIM FORM	(30)[a]	100.0	
1. no ridge	11	36.7	410(1) 411(5) 414(5)
2. rounded ridge	3	10.0	416(1) 417(2)
3. tapered rim	1	3.3	423(1)
5. sharp break angle	4	13.3	428(1) 431(1) 433(2)
6. direct rim	11	36.7	439(3) 440(1) 443(2) 445(1) 447(3) 448(1)

Notes:

[a]Number of rims scored on each variable. There are more rims scored on the elevation variable because rim fragments could often be oriented to provide the elevation angle, although they could not be assigned to a more definite form subclass.

[b]Figures in parentheses represent the number of each form present; underlined forms are unique to the Early Cuauhnáhuac phase.

rims and body sherds, however; for purposes of comparison, the total sherd counts are probably more reliable than the rim counts. The main change from the Temazcalli phase is a large increase in the proportion of unslipped comals. The overall degree of polishing (as measured by the Surface Treatment Index; Table 56) is roughly the same as in the previous phase (Temazcalli S.T.I. = 6.5); however, there is much less variation in treatment among the different finish modes (except for unslipped), again suggesting greater standardization in the manufacture of Early Cuauhnáhuac comals. The only association between surface and other dimensions is a weak tendency for the black slipped rims to have a high elevation angle, as in the previous phase.

Form.--Fifteen distinct comal forms (other than incomplete fragments) are present in this complex. The trend toward lower rim elevation angles continues through the Early Cuauhnáhuac comals; the Rim Elevation Index declines further from 2.76 to 2.44, and 18% of the forms are now "flat." Direct rims are still common, but there is a large increase in the proportion of rims lacking a ridge on the exterior wall. Two of the diagnostic forms of the Early Cuauhnáhuac complex are illustrated in Figure 42,A.B. Comal forms and form subclasses are listed in Table 57.

Discussion.--The general trend at Xochicalco toward flatter comals (reflected in the decreasing Rim Elevation Index), which starts with the Tilancingo phase and continues until the Early Cuauhnáhuac complex, finds a parallel in the Postclassic Basin of Mexico. Mazapan comals tend to have a large elevation angle and a pronounced break or elbow (Cobean 1978: Profile 191A; Whalen and Parsons n.d.:Figure 100). In the Early Aztec period, both flat and elevated forms are common, while the Late Aztec

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Figure 42. Ceramics of the Early Cuauhnáhuac Complex. A-B, comals, A (7-55, 443), B (5-15, 414); C, basin (6-42, 217); D-E, ollas, D (15-1, 120), E (18-1, 101); F-J, brown-black bowls, F (81-8, 318), G (81-3, 318), H (81-2, 318), I (83-5, miniature), J (83-7, miniature); K-L, orange slipped bowls, K (83-4, 318), L (7-21, 339).

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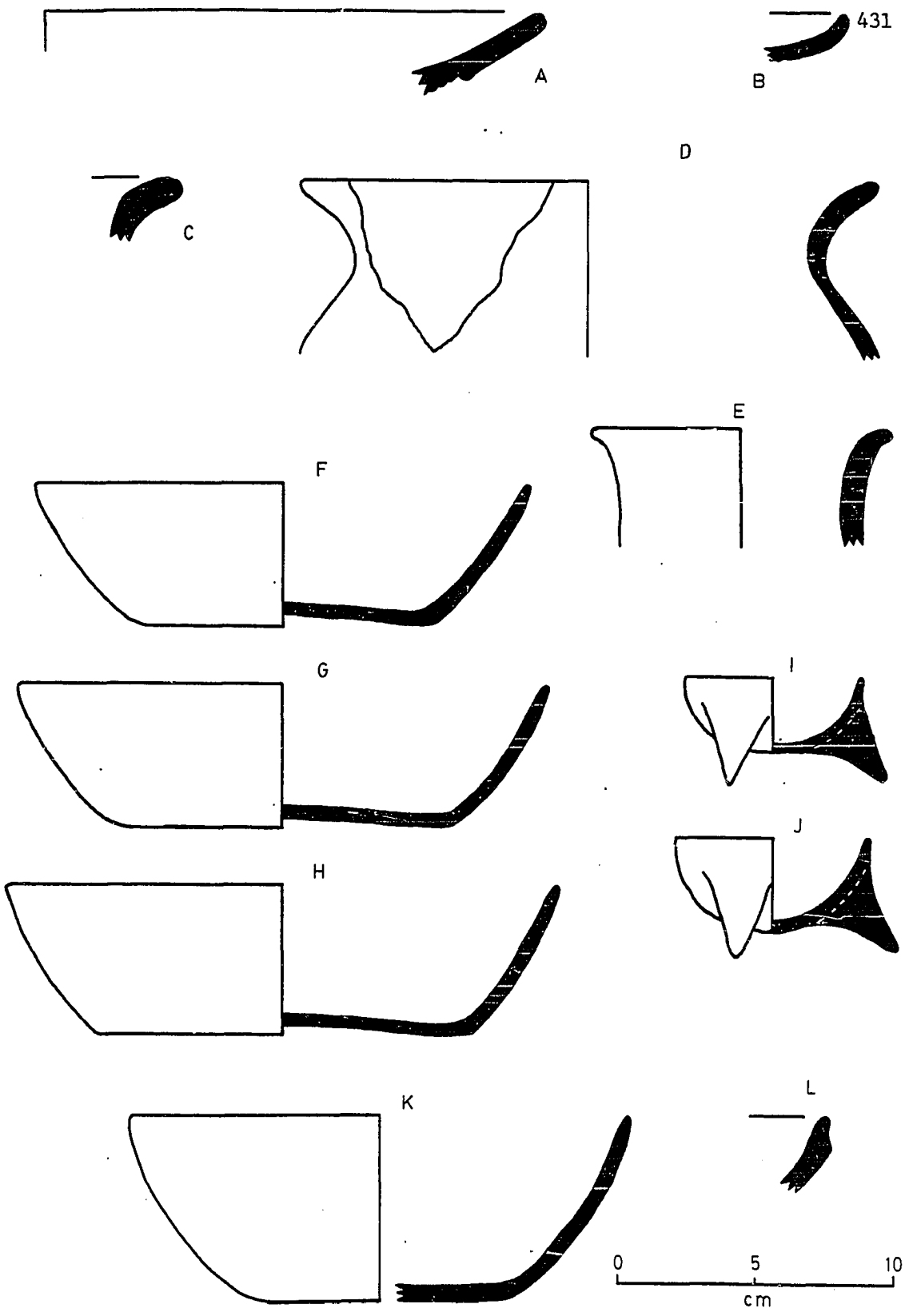

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comals tend to be either flat or else slightly elevated (Whalen and Parsons n.d.:Figures 105 and 121). Comal Form 414 (Figure 42,B), which appears to be a good chronological marker of the Early Cuauhnāhuac phase, is similar to a Late Aztec form from the Basin of Mexico (Blanton and Parsons 1971: Figure 80j).

Basins (A.2; n=5)

The Early Cuauhnāhuac basins exhibit less variability in surface finish than do earlier examples of this form class. With the exception of one anomalous white slipped sherd, only two modes--unslipped and orange slip--are represented (Table 56). Paste tends to be coarse orange (Table 55), and two non-fragmentary forms--212 and 217--are represented (see Figure 42,C for the latter). No appendages are present.

Plain Ollas (A.3; n=61)

Paste.--Buff paste sherds slightly outnumber orange examples, and texture tends to be medium or coarse with normal hardness. More than half of the sherds exhibit complete oxidation (see Table 55). Paste attributes are not associated with dimensions of form or surface.

Surface.--As in the comal subclass, there is some discrepancy between olla rims and body sherds in their relative proportions of surface finish modes (Table 56). Using the latter for comparison, there has been a decrease in unslipped ollas and an increase in orange slipped examples from the previous phase. These two modes, together with brown slip, continue to represent over 90% of all plain olla sherds. Surface treatment is less well executed than in the Temazcalli complex; every mode shows a lower Surface Treatment Index and the resulting composite Index is

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significantly lower.

Form.--Of the 38 ollas represented, all but 10 are incomplete; the 10 complete rims comprise eight different forms. The previously noted trend toward more outcurving rims continues into the Early Cuauhnáhuac phase; the Rim Curvature Index increases from 3.42 to 3.82 (Table 58). Fifteen percent of the plain rims are maximally outcurved, and again there are no vertical rims represented. Seven rims are complete enought to score on the neck height scale; the index (1.57) is considerably lower than in the Temazcalli phase, signalling a shift from predominantly high rims to mainly short examples. Only three diameter measurements are available--10, 11, and 21 cm (Table 58); no diameters were obtained from decorated ollas. A diagnostic form of the Early Cuauhnáhuac complex--no. 120--is illustrated in Figure 42,D, and an odd rim (Form 101) with a diameter measurement is also shown (Figure 42,E). Two wedge-rimmed ollas are represented in this phase.

Discussion.--Support for the proposed partition of plain ollas into functional categories is not very strong in the Early Cuauhnáhuac complex (see Table 59). Slipped ollas definitely exhibit more polishing than unslipped ollas, and the difference in their Surface Treatment Indices is quite large (4.0). Nevertheless, slipped bowls of this phase are more highly polished than unslipped examples by the same increment, while the corresponding figure for comals is 3.2 (see Table 56). Thus it is possible that the association between slipping and polishing is due primarily or entirely to general vessel finishing methods and not to intended olla function. The scanty data on Early Cuauhnáhuac olla handles and rim diameters (Table 59) are also equivocal, neither supporting nor refuting

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TABLE 58

PLAIN OLLA FORMS AND FORM SUBCLASSES OF THE EARLY CUAUHNAHUAC COMPLEX

Subclass	N	%	Constituent forms
I. RIM CURVATURE	(33)[a]	100.0	
1. vertical	-	-	
2.	1	3.0	112(1)[b]
3. moderate	9	27.3	106(9)
4.	18	54.5	105(15) 120(3)
5. outcurved	5	15.2	104(4) 127(1)
- other forms	5	-	101(2) 131(1) 133(1) 139(1)
Curvature index (mean):	3.82		
II. NECK HEIGHT	(7)[a]	100.0	
1. short	4	57.1	120(3) 131(1)
2. medium	2	28.6	127(1) 139(1)
3. high	1	14.3	112(1)
Height index (mean):	1.57		

III. RIM DIAMETER

10	11	13	14	15	16	17	18	19	20	21
X	X									X

(centimeters)

Notes:

[a]Number of rims scored on each variable.

[b]Figures in parentheses represent the number of each form present; underlined forms are unique to the Early Cuauhnáhuac phase.

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TABLE 59

OLLA FUNCTIONAL ATTRIBUTES OF THE EARLY AND LATE CUAUHNAHUAC COMPLEXES

Attributes	Early Cuauhnáhuac		Late Cuauhnáhuac	
	Unslipped	Slipped	Unslipped	Slipped
SURFACE TREATMENT				
2. smoothed	17	4	19	2
3. partially burnished	1	1	1	-
4. streaky burnished	-	2	-	-
5. burnished	8	8	-	2
7. streaky polished	-	3	-	-
8. polished	-	16	-	-
Surface Treatment Index	3.0	7.0	2.1	3.5
HANDLES				
1. horizontal loop	1	2	1	1
2. vertical loop	1	1	-	-
3. indeterminate loop	7	10	-	-
RIM DIAMETERS				
1. 10-11 cm	-	2	-	-
2. 13-15 cm	-	-	2	1
3. 17 cm	-	-	-	1
4. 20-21 cm	-	1	2	1
5. 23-24 cm	-	-	2	1
6. 27 cm	-	-	1	-
Mean Diameter	-	14.0	20.6	18.5

the hypothesized functional relationships. Unfortunately no data were recovered on decorated olla handles or rim diameters.

Storage/Transport Vessels (B)

Plain Ollas (B.1; n=61)

See discussion under section A.3 above.

Tlahuica Polychrome Ollas (B.2; n=3)

See discussion under the Temazcalli ceramic complex above.

Miscellaneous Decorated Ollas (B.3; n=13)

These thirteen body sherds are all too small to discern the nature of their decoration. One is painted in black on white, and could represent a Taxco Black-on-White Olla; the remaining sherds are painted in red on white (n=10) or red on cream (n=2), and could represent Tlahuica Polychrome Ollas or perhaps a Toluca Valley type.

Serving Vessels (C)

Plain Bowls (C.1; n=150)

Paste.--Orange paste is more than twice as common as buff paste in the Early Cuauhnáhuac plain bowls. Most sherds are medium or fine in texture, and approximately half are fully oxidized (Table 55).

Surface.--Sixteen of the 22 Postclassic combinations of interior and exterior surface treatment are represented in the Early Cuauhnáhuac plain bowls (Table 60). These 16 categories were grouped into eight surface finish modes following the procedures discussed under the Tilancingo plain bowls. As noted in the section on Temazcalli bowls

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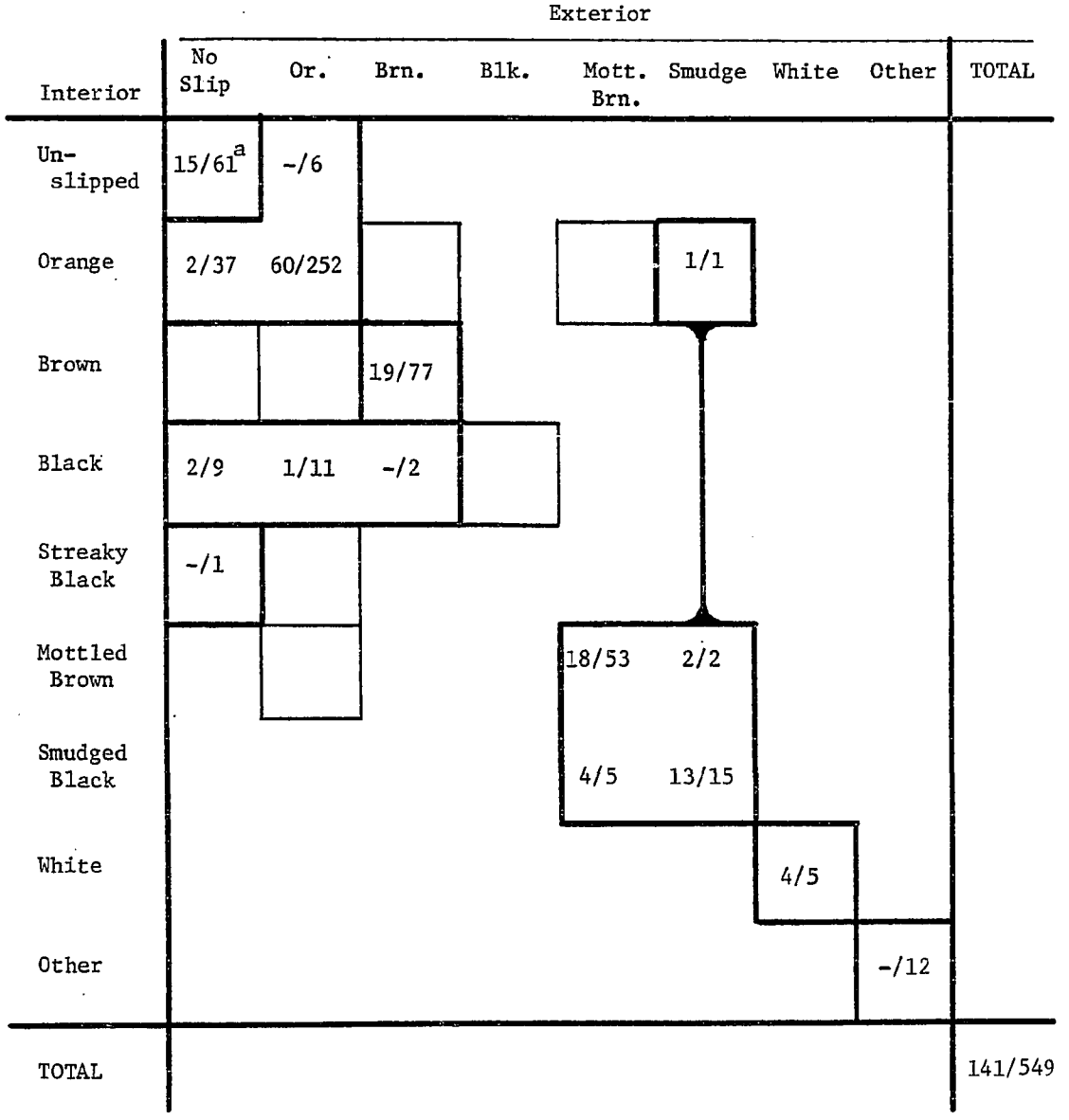
TABLE 60

SURFACE FINISH MODES OF EARLY CUAUHNAHUAC PLAIN BOWLS



[a]Entries list counts of rims and body sherds, separated by a slash.

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above, the Early Cuauhnáhuac mottled brown and black smudge finished proved to have virtually identical scores on attributes of paste, form and surface treatment, in contrast to the previous phase where the two finishes exhibit significant differences. Accordingly, all sherds with mottled brown and/or black smudge surfaces are here grouped into a single "brown-black" mode; these are quite distinct from the "brown" mode, which grades into orange and does not show signs of deliberate smudging.

Frequencies of the Early Cuauhnáhuac surface finish modes are given in Table 56. It can be seen that the rims slightly underrepresent the total number of orange slip sherds, while they overrepresent the brown-black total (this latter is due in large part to the inclusion of 10 burial vessels which inflate the rim count to a greater extent than they do the total sherd count). Compared to the previous phase, the unslipped and orange slip modes show slight increases, and the brown-black mode shows a large increase over the Temazcalli mottled brown mode. Accompanying these increases are decreases in the brown slip and black slip interior modes. As a result of these changes, the black slip interior and brown-black modes are consistent, but not exclusive, markers of the Early and Late Cuauhnáhuac phases, and the Tilancingo and Temazcalli phases, respectively. Twelve body sherds from unit 7 exhibit an unusual streaky brown and black finish that is distinct from any of the surface finish modes; these comprise the "other" category in Tables 56 and 60.

With the exception of the unslipped and black slip interior modes, every slip category exhibits a greater proportion of polished surfaces than in the previous phases; this change is reflected in an increase in the Surface Treatment Index (Table 56). The brown-black mode is the most

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highly polished category; with the exception of one burnished exterior and four cases of streaky polishing, all brown-black surfaces are polished.

Form.--The Early Cuauhnáhuac form repertoire is quite similar to that from the preceding phase--hemispherical and conical bowls have a similar ratio, and together comprise over 80% of the forms, and the remaining examples are more or less evenly distributed among the other subclasses (see Table 61). The only differences are: (1) no outcurved forms are present; (2) conical bowls are slightly more common; and (3) miniature bowls are more prevalent. These latter two forms are characteristic of the brown-black bowls, and their increase is linked to the growth in popularity of the brown-black surface finish. Of the 32 brown-black rims, 14 are hemispherical (Form 315), 14 are conical (318:7; 319:7), and 4 are miniature hemispherical bowls. The miniatures all have diameters between 6.5 and 8 cm, while the other brown-black forms cluster between 18 and 20 cm in diameter (n=9); a marked bimodality of size is thus present in this bowl class, although not in the remaining plain bowls (see Table 65). The seven examples of Form 318 are all whole or partial vessels recovered from Burial 2; three of these are illustrated in Figure 42,F-H. All of these seven brown-black bowls exhibit a raised base. Three of the four miniature bowls were recovered from Burial 3; two are shown in Figure 42,I,J. The miniature bowls almost exclusively exhibit a brown-black surface, and almost always have miniature solid tripod supports as shown in the illustrations. Six additional miniature supports were recovered from quantified Early Cuauhnáhuac levels; one has orange slip and the rest are brown-black. This miniature form (and the individual supports) are good markers of the Early and Late Cuauhnáhuac phases in

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TABLE 61

PLAIN BOWL FORMS AND FORM SUBCLASSES OF THE EARLY CUAUHNAHUAC COMPLEX

Subclass	N	%	Constituent Forms	Eroded Bowls	
				N	Forms
2. Incurved	1	0.8	311(1)	-	
3. Hemispherical	70	56.0	315(69) 316(1)	3	315(3)
4. Conical	34	27.2	317(1) 318(8) 319(21) 320(4)	1	317(1)
5. Straight	4	3.2	322(1) 323(3)	-	
6. Everted	4	3.2	327(1) 331(3)	-	
7. Recurved	4	3.2	332(1) 339(3)	-	
8. Miniature	4	3.2	520(4)	-	
9. Other	4	3.2	301(4)	-	
Total non-fragmentary	125				
Total fragmentary	11		300(3) 305(4) 306(3) 307(1)		
Total eroded	4				
Total Bowl Rims	140				

western Morelos. A number of additional examples were recovered in non-quantified levels, and they are quite common in surface collections from Late Postclassic sites; however, one example was recovered in a Temazcalli context. As a contrast to the Brown-black conical bowls, an orange slipped vessel from Burial 3 is illustrated in Figure 42,K; it is somewhat deeper than the brown-black examples, and does not exhibit the raised base feature. Finally, a variant of Form 339, common in the Temazcalli and Early Cuauhnáhuac phases, is shown in Figure 42,L. Four non-miniature non-decorated vessel supports were also recovered in Early Cuauhnáhuac levels; however, all had at least one eroded surface, and thus almost certainly pertain to decorated bowls rather than to the plain class.

B-3 Polychrome (C.2; n=2)

In terms of formal definition, the B-3 Tlahuica Polychrome type is a variant of the B-1 type (i.e. there is a single horizontal decorative zone on the exterior surface, in which a band of motifs is found). It is distinguished from the B-1 type by two features. First, the horizontal decorative zone is defined by parallel red bands in addition to the sets of thin black lines. The top band is the typical red rim band of the B group (B-3 bowls never have the red rim triangles in place of the rim band), and the bottom red band is a feature not found in the B-1 class. Second, the decoration always consists of a band of continuous touching scrolls, and never discrete circles or scrolls as in many B-1 examples; furthermore, the scrolls are generally done with thinner lines than the B-1 designs. Two complete vessels of the B-3 type were recovered from Burial 3; these are illustrated in Figure 43,A,B. The two bowls have

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Figure 43. Ceramics of the Early Cuauhnáhuac Complex. A-B, B-3 polychrome bowls, A (83-1, 322), B (83-2, 318); C-F, B-4 polychrome bowls, C, Late Cuauhnáhuac (3-61, 334), D-E, Early Cuauhnáhuac, D (5-25, 319), E (15-87, 334), F, Late Cuauhnáhuac (1-15, 322); G, type A-2, Teopanzolco import (81-5, 319).

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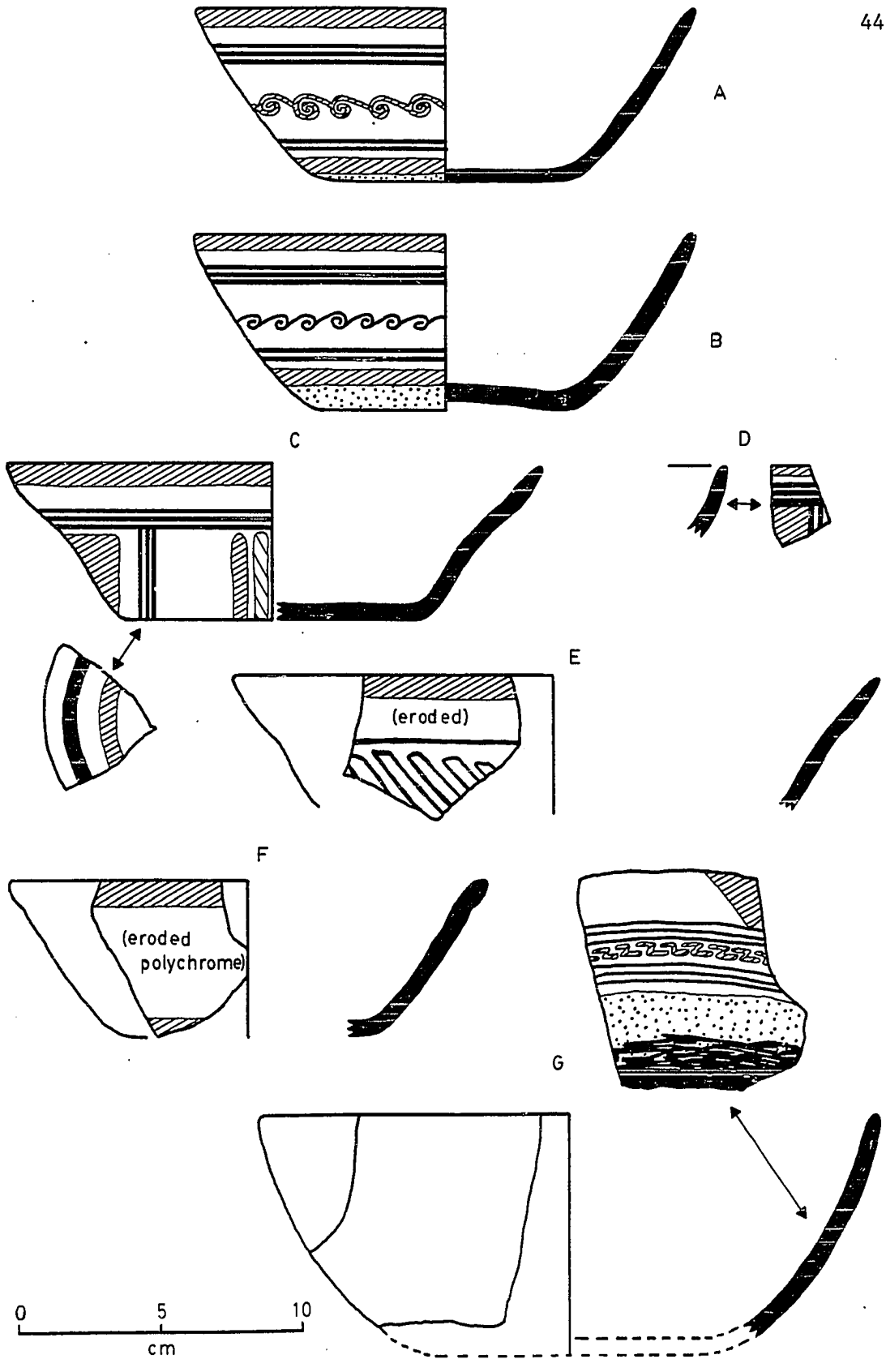

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slightly different forms (322 and 318), and one has red scrolls pointing left and the other black scrolls pointing right. Both have orange paste and black interiors (the first appears to be black smudge and the second is streaky black over an orange slip). This type is quite rare; in addition to these two vessels, a few examples have been recovered from Coatetelco and the Palacio de Cortés excavations in Cuernavaca (Smith n.d.). In terms of stylistic development, the B-3 decoration probably represents an evolution of the B-1 design structure; all known examples of B-3 Polychrome date to the Late Postclassic period.

B-4 Polychrome (C.3; n=36)

Definition.--The B-4 Tlahuica Polychrome class is defined under the Temazcalli complex above. Because no significant differences were observed between the Early and Late Cuauhnáhuac phase examples of this type, the two collections are described together here (only 10 examples pertain to the latter phase, so the following description is based on 46 sherds). The Early and Late Cuauhnáhuac examples of B-4 Polychrome bowls do show some differences from earlier Temazcalli representatives, however. A further reason for combining the descriptions of the Early and Late Cuauhnáhuac examples is that a corresponding subdivision of the Late Postclassic period has yet to be made in other parts of Morelos, and thus the combined Xochicalco Polychromes will cover the same time span as those from other Late Postclassic sites. Nevertheless, it is hoped that distinctions between the two Late Postclassic phase examples of the B-4 class will be made in the future.

Paste.--The paste of these sherds is quite similar to that of the

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Temazcalli examples, orange predominates over buff at a 3 to 1 ratio, most sherds have medium texture, and approximately half are fully oxidized (Table 62).

Surface.--As in the Temazcalli phase, most of the exterior polychrome surfaces are burnished (n=18), while the rest are polished (n=8); many of the sherds from these two phases have somewhat eroded surfaces and the degree of polishing cannot be determined. Interior surfaces exhibit four modes of finish: unslipped (n=23), orange slip (n=3), black slip (n=12), and streaky black slip (n=6). These figures reveal two differences from the Temazcalli B-4 interiors: there is a greater proportion of unslipped surfaces (52.3% compared to 37.5%), and a corresponding smaller percentage of black slipped surfaces (27.3% compared to 43.8%). The decline in black slipped interiors parallels the decline in this mode among the plain bowls. Aside from the unslipped surfaces, which are variable in their treatment, nearly all interiors are polished, and thus more highly polished than their exteriors; this represents an increase in the frequency of polished interiors from the previous phase.

Decoration.--Because of the eroded and fragmentary nature of most B-4 Polychrome sherds from these phases, not much can be said concerning their decoration. Decorative variants a and c are definitely present (see Figure 38,A,C), and all four variants are found in contemporaneous occupations at Coatetelco and Coatlan Viejo in western Morelos (Smith n.d.). A Late Cuauhnáhuac partial vessel with design variant a is illustrated in Figure 43,D. An unusual sherd with diagonal elements, recovered in Early Cuauhnáhuac deposits, is shown in Figure 43,E. A number of examples exhibit the concentric red and black circular rings on

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TABLE 62

PASTE MODES OF SELECTED EARLY CUAUHNAHUAC DECORATIVE CLASSES

Dimension	B-4[a] Polychrome		Guinda		Malinalco Polychrome		Eroded Decorated Bowls	
	N	%	N	%	N	%	N	%
Paste Color								
1. Orange	34	73.9	14	26.9	3	60.0	6	46.2
2. Orange-Buff	-	-	4	7.7	-	-	-	-
3. Buff	11	23.9	34	65.4	-	-	7	53.8
4. Brown	-	-	-	-	1	20.0	-	-
5. Grey	-	-	-	-	1	20.0	-	-
6. Black	1	2.2	-	-	-	-	-	-
Texture								
1. Very Fine	-	-	-	-	-	-	1	7.7
2. Fine	10	21.7	32	61.5	-	-	1	7.7
3. Medium	30	65.2	18	34.6	5	100.0	8	61.5
4. Coarse	6	13.0	2	3.8	-	-	3	23.1
5. Very Coarse	-	-	-	-	-	-	-	-
Oxidation								
1. Complete	23	51.1	13	25.0	5	100.0	6	46.2
2. Partial	15	33.3	24	46.2	-	-	6	46.2
3. Slight	7	15.6	15	28.8	-	-	1	7.7
Number of Sherds	46		52		5		13	

Note: [a]This class includes ten sherds from the Late Cuauhnáhuac complex in addition to the 36 from the Early Cuauhnáhuac complex.

the exterior base.

Form.--Twenty-two B-4 Polychrome rims are available from the two phases. These comprise four hemispherical forms (315), eight conical (319), one straight (322), and six recurved forms (334); in addition, one rim from either Form 322 or 334 is included, plus two fragmentary examples (300). Bowl Form 334 is quite common in the B-4 type throughout Late Postclassic Morelos (see Figure 43,C,E), and may be characteristic of this period as compared with the Temazcalli phase (which only had one possible example of the form). Aside from the increase in this form, these phases also show more hemispherical and fewer straight flaring forms than the prior complex. The one example of a straight rim comes from a highly eroded B-4 partial vessel, and is shown in Figure 43,F. Two examples of the raised or convex base mode are found on B-4 Polychrome vessels from the Late Cuauhnáhuac phase.

Discussion.--As noted above, B-4 Tlahuica Polychrome bowls are found all over western Morelos in the Late Postclassic period. The limits of its distribution coincide with the boundaries of the Cuauhnáhuac province (see Chapter 3). Type B-4 has been found in significant numbers from Cuernavaca in the northeast to Chimalacatlan in the southeast. Its western limit appears to follow the modern state line (which follows the Cuauhnáhuac province border), given its prevalence in the Rio Chalma Reconnaissance area and at Zacatepechi, and its rarity at Malinalco, where it is almost certainly a trade ware. East of Cuernavaca, the related Tlahuica Polychrome type B-5 replaces B-4 as the most common Late Postclassic Polychrome class, although its distribution is incompletely known (Smith n.d.). Many complete vessels and sherds of type B-4 with large decorated areas are known from

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Coatetelco, Coatlan Viejo and sites in Cuernavaca, and these permit more extensive stylistic analysis than the meager collection of eroded sherds from Xochicalco. Description and analysis of this wider corpus of Tlahuica Polychrome bowls is presented elsewhere (Smith n.d.). It may be noted here, however, that the decorative patterns and vessel forms of the Early and Late Cuauhnáhuac B-4 Polychrome bowls are entirely consistent with the other collections mentioned above. No geographical patterns of stylistic variation have been isolated for this class, and it is possible that all of these examples have the same center of manufacture.

Imports from the Teopánzolco Ceramic Complex (C.4; n=15)

Type A-1 (n=2).--See the discussion under the Temazcalli complex.

Type A-2 (n=1).--This type is identical to Type A-1 in the design layout, motifs and colors, but has the decoration on the interior instead of the exterior. An example from Burial 2 is shown in Figure 43,G.

Type B-2 (n=1).--This is the rarest Tlahuica Polychrome class yet isolated, and is the only one whose definition incorporates vessel form in addition to decorative pattern. The type consists of large basins or bowls (diameter ca. 30 cm) with thick walls (ca. 10 mm), decorated on the exterior surface. The design field has the same structure as that of Type B-4, variant b, with alternating zones on either side of the red rectangle; one consists of horizontal rows of scrolls, the other of a large diamond shaped motif with small attached scrolls. The general painting style and the nature of the scrolls used (especially in the narrow continuous horizontal zone) is that of Type B-1 rather than B-4. A whole vessel of this type, excavated from Teopanzolco, is on display in the Palacio

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de Cortés Museum in Cuernavaca.

Type D (n=2).--See the discussion under the Temazcalli complex.

Type G (n=6).--See the discussion under the Temazcalli complex.

Type H (n=1).--This type consists of bowls decorated on the interior surface in black on red and white. The entire inner surface is first painted in white. Then three panels of red paint are applied, leaving equal size white panels between them. Finally, decoration in thin black lines is done over the whole interior surface (Smith n.d.).

Black-Rim Orange (n=2).--See the discussion under the Temazcalli complex.

Discussion.--Given the present lack of chronological division of the Teopanzolco ceramic phase, differences between the Temazcalli and Early Cuauhnáhuac phase imported types at Xochicalco may or may not have significance; if so, the differences may aid in the establishment of a finer chronology for the Cuernavaca region. Teopanzolco types found only in the Temazcalli complex are B-1, A/B; those found only in the Early Cuauhnáhuac phase are A-2, B-2, and H; types found in both phases are A-1, D, G, and Black-Rim Orange.

Eroded Tlahuica Polychrome Bowls (C.5; n=2)

These two eroded body sherds appear to pertain to one of the Tlahuica Polychrome bowl types. One has decoration on the interior (possible types: A-2, D, F, G, H), and the other on the exterior (possible types: A-1, B-1 through B-5, E).

Guinda (C.6; n=52)

Definition.--See discussion under the Tilancingo complex.

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Paste.--Early Cuauhnáhuac Guinda paste is typical of the class in general, in that buff paste predominates, most sherds are fine textured, and most are incompletely oxidized (Table 62). One of the two paste-types present in the Temazcalli Guinda--fine, incompletely oxidized buff--is found in the present phase, while the other--fine, oxidized orange--does not stand out as distinct. As in the Temazcalli Guinda, however, the distinct buff paste type (n=22) does not show significant associations with other dimensions beyond the fact that it is only represented in hemispherical bowls.

Surface.--Table 63 presents figures on the different combinations of interior and exterior surface finish encountered in the Guinda vessels of the Early Cuauhnáhuac phase. It can be seen that unslipped interiors, while still not very common, are more heavily represented than in the Temazcalli phase. Three of these examples are not bowls (see below), but still over 10% of the Early Cuauhnáhuac Guinda bowls lack slip on their interior, compared with less than 1% in the previous phase. Only two sherds have non-guinda slipped interiors (one orange, one black), and the grey smudge interior is present but less common than in the Temazcalli Guinda. A far greater proportion of the sherds (66.7%) have Guinda exteriors, compared to the previous phase, where less than half (46.8%) have slipped exteriors. The decline in unslipped exterior surfaces is related to a decline in red rim bands below the exterior rim; in the Early Cuauhnáhuac phase, seven of the eighteen bowl rims have black exterior rim bands (usually painted over a guinda slip). As in all Morelos Guinda ceramics, most of the red surfaces are polished, while the unslipped surfaces range from smoothed to polished (pitcher and copa

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TABLE 63

MODES OF SURFACE FINISH IN THE EARLY CUAUHNAHUAC GUINDA CLASS

Interior	Exterior				Total	
	unslipped	red	black/ red	bl & wh/ red	N	%
unslipped	-	3	4	1	8	15.7
red	11	8	9	1	29	56.9
black/ red	5	2	-	-	7	13.7
black & wh/ red	1	-	1	-	2	3.9
orange slip	-	-	1	-	1	2.0
black slip	-	-	-	1	1	2.0
gray smudge	-	1	2	-	3	5.9
Total N	17	14	17	3	51	
Total %	33.3	27.5	33.3	5.9		100.0

interiors are usually smoothed).

Decoration.--Only one possible example of the characteristic Temazcalli Guinda decorative pattern (black triangles and horizontal lines on the interior red surface) was recovered from Early Cuauhnáhuac levels. The only decorative pattern that may be diagnostic of the Guinda class of the present complex involves wide horizontal black bands on the exterior wall. One manifestation of this pattern is the black rim band mentioned above; in other cases the band is painted somewhat below the rim (Figure 44,A). Another manifestation of this pattern consists of parallel black bands with alternating diagonal bands running between them; the resulting interior triangles are then painted in white (Figure 44,B). This particular design is common in the Guinda ceramics of the Basin of Mexico (see below). Use of white paint on the Guinda surface continues to be found at about the same level as previously (just less than 10% of the sherds have white paint); one sherd with black and white on red decoration is shown in Figure 44,C. Aside from these observations, motifs such as scrolls, circles, and S-designs continue to be popular. A complete pitcher recovered in Burial 3 exhibits some of the scroll designs of this phase (Figure 44,D).

Form.--Although a new form is added to the Early Cuauhnáhuac Guinda type (the copa--see Figure 44,E), the bowl forms show less diversity than in the Temazcalli phase. Fifteen of the 21 forms represented are hemispherical (Form 315:14; 316:1), two are recurved (Form 332), and one plato (362), two pitchers, and one copa comprise the non-bowl forms (these are listed in Table 64). Compared to the Temazcalli Guinda, there are no incurved, conical or everted forms, while the recurved and copa forms are

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Figure 44. Ceramics of the Early Cuauhnáhuac Complex. A-E, Guinda vessels, A (15-73, 315), B (7-69, 315), C (7-70, 316), D (83-3, pitcher), E (18-49, copa); F-G, Malinalco polychrome, F (5-34, 315), G (6-65, 319); H-I, Aztec III Black-on-Orange, H (18-00, 364), I (15-00, 319).

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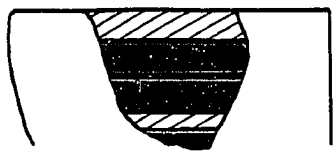

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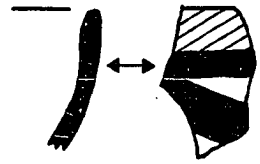
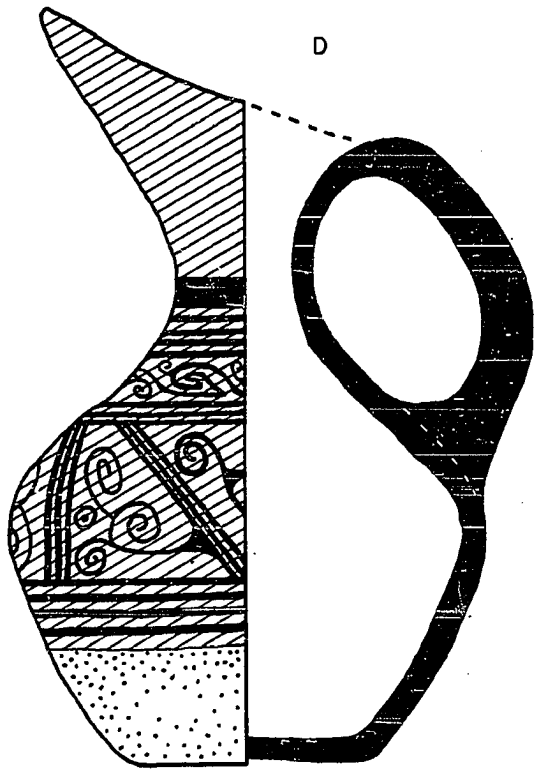
B





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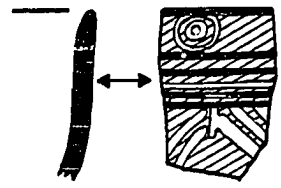

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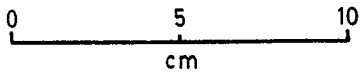

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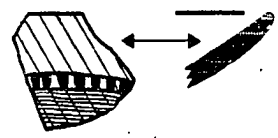

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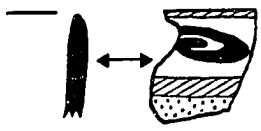

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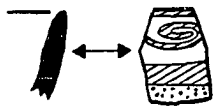

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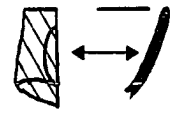

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new. One dimple base was found, as was a hollow support fragment with Guinda decoration. Three diameters are available: 6.5 cm (the copa), 17 cm and 19 cm.

Discussion.--Fewer specific parallels may be drawn between the Guinda ceramics of Xochicalco and those of the Basin of Mexico for this period than for the preceding period; this may relate more to the lack of chronological control over the type in the Basin of Mexico (where fewer Late Aztec markers have been isolated) than to a divergence between the two areas. The white triangles within wide black bands found in the Early Cuauhnáhuac Guinda class are quite common in the Basin of Mexico (Cf. Parsons' Black-and-White-on-Red, Variant A; 1966:228ff, Plates 77-80), where it occurs in both the Early and Late Aztec periods (1966:Table 35; Blanton and Parsons 1971:311f; Whalen and Parsons n.d.:Figure 116). Sanders, Parsons and Santley illustrate this decoration (1979:469) as an Early Aztec characteristic, but as the above sources indicate, it is not limited to that period and thus the attribution is misleading. The copa form, appearing at Xochicalco for the first time in the present phase, is similarly a Late Aztec form in the Basin of Mexico, given its absence from Early Aztec levels in the Teotihuacan Valley (Parsons 1966:Tables 33 and 35). The examples from the Basin of Mexico (1966:Figure 93) are larger than the Morelos copas, and have flaring rather than incurved rims. The Xochicalco example is identical to the many copas (whole and partial) recovered from burial contexts at Coatetelco (Smith n.d.).

One chronological marker which has been isolated for the Late Aztec Guinda of the Basin of Mexico consists of groups of thin vertical black lines on bowl exteriors; this is known as "comb" decoration (Blanton

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and Parsons 1971:311; Sanders, Parsons and Santley 1979:473). Although this type of design is found at other Late Postclassic sites in Morelos (such as Coatlan Viejo--Mason 1980:367, Coatetelco and the Palacio de Cortés--Smith n.d.), it is conspicuous by its absence at Xochicalco. Vessels with this decoration appear to be quite standardized in paste, form and surface, and the Morelos examples probably represent imports from the Basin of Mexico.

Graphite Guinda (C.7; n=2)

See the discussion under the Temazcalli complex.

Chalco-Cholula Polychrome (C.8; n=2)

See the discussion under the Temazcalli complex.

Malinalco Polychrome (C.9; n=5)

Definition.--Malinalco Polychrome is defined by black and red on white decoration in a narrow band (2-3 cm in width) running along the exterior vessel wall immediately below the rim. The white decorative field is demarcated by parallel red bands (the top one of which often covers only the very tip of the rim), and decoration within the field consists of a series of discrete S-scrolls in black and/or red. In addition to the five examples from quantified levels, several sherds of this class were recovered from non-quantified Early Cuauhnáhuac levels.

Description.--Sherds of this type have medium textured orange paste; two examples have brown and grey paste, probably indicating reduction of the basic orange color (Table 62). The decorated zone is polished, while the exterior surface below this zone is unslipped and burnished. One interior shows black slip, while the remainder are unslipped and

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burnished. Decoration is uniform with the exception of the color of the scrolls; three examples have black scrolls (Figure 44,F) and in two cases they are red (Figure 44,G). Three of the four rims represent hemispherical Form 315, and the fourth is conical (319); no diameters are available.

Discussion.--I am proposing Malinalco Polychrome as the name for this type given its prevalence at that site. It represents the most common decorative class by far in the excavations of Galván in the modern town of Malinalco; its 685 sherds comprise 5.0% of all sherds, and 18.7% of all decorated sherds from all periods (Galván 1974/75:Cuadros 1,2,3). Galván (p. 79) calls the type "Tlahuica Laca" and states that it is described from Teopanzolco by Noguera and Piña Chán (1956/57); he is wrong on all three counts, however. The type does not fall within the Tlahuica Polychrome style as defined above and neither is there any evidence that Malinalco was inhabited by people of Tlahuica descent (see Chapter 2). The decorative technique is not that of "laca" as defined by Noguera (1954:138ff), although the surface is lustrous; and finally, this type does not occur at Teopanzolco and Noguera and Piña Chán (1956/57) do not describe it in their report on ceramics from that site.

The definition stated above for the Malinalco Polychrome type applies equally well to the illustrated examples in Galván (1974/75: Láminas 104-107) and to the imports at Xochicalco. The Early Cuauhnáhuac sherds are also well within Galván's type description (pp. 79f), and the forms are identical, since the examples from Malinalco are primarily conical and hemispherical bowls (Galván 1974/75:Láminas 101-107). Galván (p. 79) attributes this type to his Phase 6, but his level charts (Cuadros 1,2,3) show that it is common in both Phases 6 and 7 in all three excavations. In Pit 1, some examples are found in Phase 5 levels, but these

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appear to be mixed deposits; there are no examples in the unmixed Phase 5 levels in Pit 3. Thus given my interpretation of the Malinalco sequence, which equates Phases 5, 6, and 7 with the Early, Middle and Late Postclassic periods (see Chapter 7), it may be concluded that Malinalco Polychrome represents a major component of the Middle and Late Postclassic ceramic complexes at Malinalco. Its temporal distribution parallels that of the Tlahuica Polychrome style, to which its greatest similarity may be found with types B-1 and A-1 of the Teopanzolco ceramic complex. The major difference between Malinalco Polychrome and the Tlahuica Polychrome style lies in its absence of thin black parallel lines as zone dividers. This may seem like a minor distinction, but every example of Tlahuica Polychrome painting has these dividers, including types whose decorative zone consists of a narrow band similar to that of the Malinalco type (e.g. types A-1, A-2, E-1, E-2 of the Teopanzolco complex). In those Tlahuica Polychrome types where red bands are used to outline decorative zones (as in the Malinalco type), they are invariably used in conjunction with the thin black lines; see Figure 43,A,B). Ethnographic research has shown that in ceramic painting styles where zonation is standardized and important structurally (as in the Tlahuica Polychrome style, but not in the Guinda style), lines dividing the vessel surface into zones are of fundamental importance both visually and cognitively (see Bunzel 1929:13).

Based upon these considerations, the Malinalco and Tlahuica Polychrome styles may be viewed as contemporaneous yet distinct developments, probably related in some manner (see Chapter 7). Several examples of B-4 Polychrome bowls were recovered from Phase 6 levels at Malinalco (Galván 1974/75:Lámina 108), and probably represent contact with the

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Temazcalli phase populations of western Morelos. In addition to the Malinalco Polychrome sherds from Early Cuauhnáhuac contexts at Xochicalco, examples have been recovered from the Late Postclassic sites of Coatlan Viejo (Mason 1980:351) and Coatetelco (Smith n.d.). No examples have been found from Teopanzolco phase contexts in Cuernavaca, so the period of distribution of the type in Morelos appears to be limited to the Late Postclassic time span (in spite of its Middle Postclassic origin at Malinalco).

Aztec III Black-on-Orange (C.10; n=12)

Twelve sherds of this distinctive Late Aztec decorative type were recovered from Early Cuauhnáhuac contexts (Figure 44,H); one example is a rim from a miniature bowl (Figure 44,I). This type is a good marker of the Late Aztec period in the Basin of Mexico, but chronological subdivisions have yet to be made. It is found in small but consistent frequencies in many parts of central Mexico outside of the Basin of Mexico (see Parsons 1966:394-441), and its appearance in these areas is usually attributed to the final century of the Prehispanic era, presumably resulting from conquest of these regions by the Triple Alliance (e.g. Parsons 1966:445-447; Vargas 1975:223f, 233; Angulo 1976:197f; Mason 1980:11-13). The presence of Azted III Black-on-Orange sherds in Early Cuauhnáhuac deposits at Xochicalco casts serious doubts upon this assumed association of the type with Triple Alliance military expansion, because this phase predates the formation of the Triple Alliance in the Basin of Mexico (see Chapter 7). Aztec III Black-on-Orange is also found at the sites of Coatlan Viejo (Mason 1980: 87f), Coatetelco, and the Palacio de Cortés (Smith n.d.). In addition to the 12 sherds from quantified levels, many of the unquantified Early Cuauhnáhuac deposits contain examples of this type.

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Incised Redware (C.11; n=1)

See the discussion under the Temazcalli complex.

Red-on-Buff (C.12; n=2)

These two fragmentary body sherds both have medium texture orange paste and show signs of red on buff decoration on their exterior surfaces. Designs are not discernible.

Eroded Decorated Bowls (C.13; n=13)

Paste characteristics of these sherds are listed in Table 62. Ten rims are present, consisting of hemispherical (315:4), conical (319:2; 320:1), unusual (301:1) and fragmentary (300:2) forms. Most of these appear to have been decorated in black and/or red on white, although red on buff or cream may also be represented.

Serving Vessels: Summary of Forms

Locally made bowls of the Early Cuauhnāhuac complex exhibit a lower degree of form variability than those of the previous phase (see Table 64). Although all but one form subclass (outcurved) continue to be represented, the number of individual forms recovered drops from 23 to 19. Plain bowls continue to show much more form variation than the decorated classes, but again this is in large part a function of the larger number of rims represented. The hemispherical and conical subclasses continue as the dominant kinds of form at the same level as before. Again, some forms show significant associations with particular plain or decorative classes. Form 316, which was limited in prior phases to Guinda bowls, is represented here in one Guinda and one plain rim. Conical forms continue to be common on the

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TABLE 64

BOWL FORMS BY DECORATIVE CLASS, EARLY CUAUHNAHUAC COMPLEX

Form Subclass	Form	LOCAL					IMPORTED			Eroded Bowls	Total
		C.1 Plain	C.2 B-3	C.3 B-4	C.6 Guinda	C.13 Eroded Decorated	C.4 Teopanzolco	C.9 Malinalco	C.10 Aztec III		
INCURVED	311	1									1
HEMI-SPHERICAL	315	69		4	14	4	6	3		3	106
	316	1			1		1				
CONICAL	317	1								1	49
	318	8	1								
	319	21		7		2	1	1	1		
	320	4				1					
STRAIGHT	322	1	1								5
	323	3									
EVERTED	327	1									4
	331	3									
RECURVED	332	1			2						10
	334			4							
	339	3									

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TABLE 64 (continued)

Form Subclass	Form	LOCAL					IMPORTED				Total
		C.1 Plain	C.2 B-3	C.3 B-4	C.6 Guinda	C.13 Eroded Decorated	C.4 Teopanzolco	C.9 Malinalco	C.10 Aztec III	- Eroded Bowls	
PLATO	362				1						2
	364								1		
MINIATURE	520	4									4
OTHER	301	4				1					8
	601				2						
	603				1						
FRAGMENTARY	300	3		2		2	1				17
	305	4					1				
	306	3									
	307	1									
TOTAL		136	2	17	21	10	10	4	2	4	206

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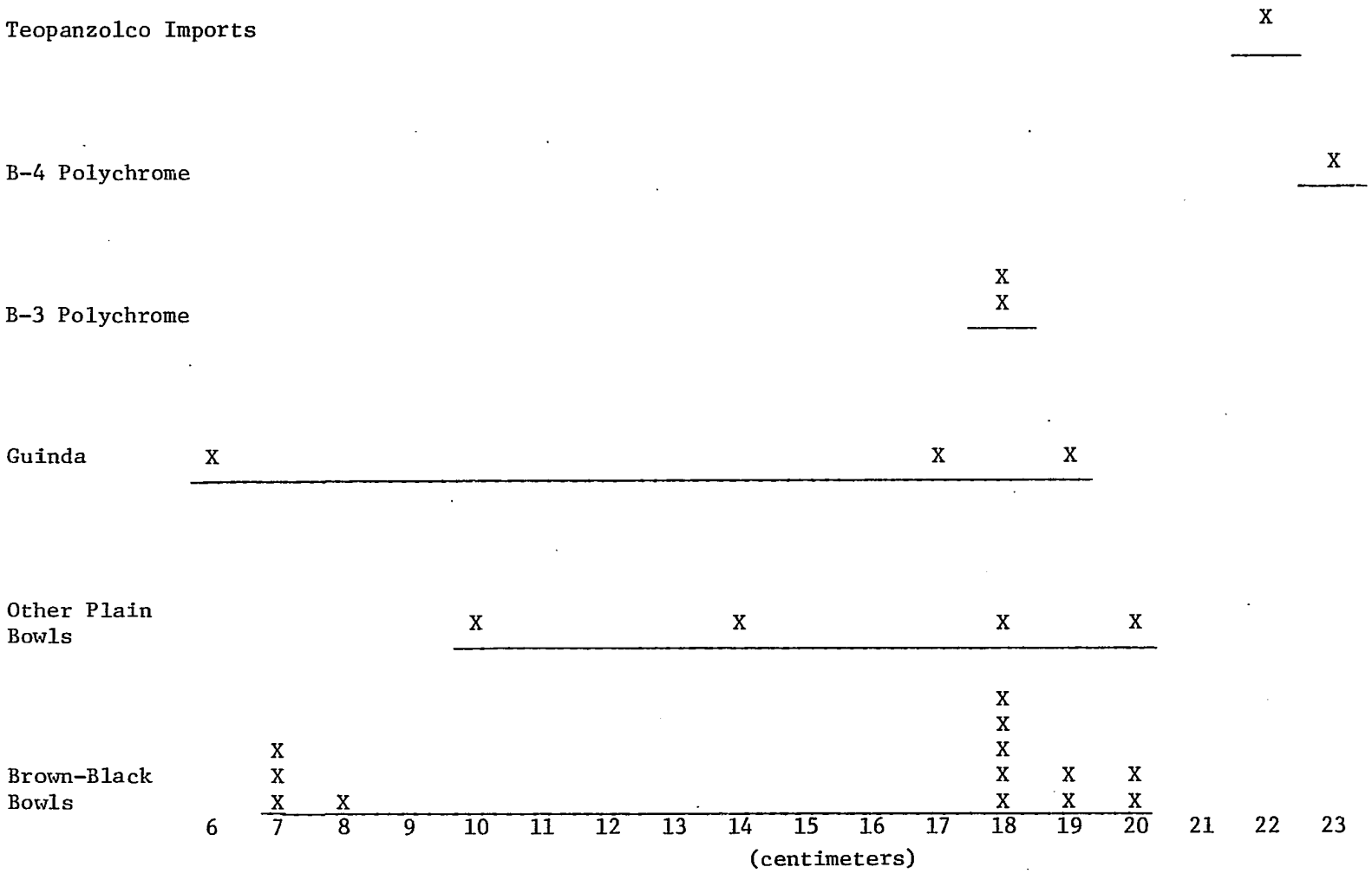
TABLE 65

BOWL RIM DIAMETERS OF THE EARLY CUAUHNAHUAC COMPLEX



B-4 Polychrome vessels, but unlike prior phases they are not represented in the Guinda class. Among the recurved forms, Form 339 is again represented only on plain bowls, while Form 334 is limited to the B-4 Polychrome class. Miniature forms are found only with brown-black bowls, and platos are used only for decorated vessels. In addition to the pitcher, another specialized serving vessel--the copa-- is found in the Guinda class.

Compared with the earlier phases, imported decorated bowls show far less form variability. With the exception of one Aztec III plato, all imports are either hemispherical or conical (Table 64). This is probably related to the fact that two of the three clases of imported bowls originate in nearby related ceramic complexes (Teopanzolco and Malinalco), and the distinctive Toluca Red-on-White and Wavy Line Red-on-Cream types are no longer represented.

Bowl diameters (Table 65) show some interesting patterns. Although the same number of diameter measurements are available for the Temazcalli complex (24), 13 of these are from the brown-black class, which shows a marked bimodal size distribution. These bowls are found only in the miniature size, with tripod supports, or in a large size with a modal diameter of 19 cm. The remaining plain bowls are spread out in size, from 10 to 20 cm (although only four measurements are available). The decorative classes represented appear to form a loose cluster around the 18 to 22 cm size, although one small Guinda vessel (the copa) is present as well.

Special Purpose Vessels and Other Ceramic Artifacts (D)

Texcoco Fabric Marked (D.1; n=6)

See discussion under the Tilancingo ceramic complex. In addition

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to these six sherds, Texcoco Fabric Marked is also common in unquantified deposits from this phase.

Texcoco Molded/Texcoco Filleted (D.2; n=2)

These distinctive types from the Basin of Mexico consist of thin walled sahumadors (O'Neill calls this class "Embossed Sahumadores"--1966: 143). As the data of Tolstoy (1958:49), Parsons (1966:255f) and O'Neill (1962:276) show, these vessels are confined to the Late Aztec period in the Basin of Mexico. A number of whole vessels of this type were recovered from Late Postclassic burial offerings at Coatetelco (Smith n.d.).

Sahumadors (D.3; n=10)

This class consists of sahumador fragments that do not belong to the previous class (their walls are thicker and they do not exhibit the molding or filleting). They are similar to examples from the Tilancingo and Temazcalli phases.

Deeply Incised Incensarios (D.4; n=3)

This is the only kind of non-sahumador incensario represented in the Early Cuauhnáhuac complex. The three examples appear to be identical to those found in Temazcalli levels (see Séjourné 1970:Figure 39; O'Neill 1962:152ff).

Spindle Whorls (D.5; n=8)

Early Cuauhnáhuac quantified deposits yielded eight spindle whorls. Refuse levels produced five small and two large examples, while one small whorl was recovered from Burial 3. In addition, nonquantified deposits produced seven small and one large whorl. See the discussion of these

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items under the Temazcalli complex.

Figurines (D.6; n=2)

As was the case for the Temazcalli complex, two fragmentary figurines were recovered, and they appear to be similar to the "Aztec" figurines described in Parsons (1972b).

Non-Postclassic Sherds (E; n=5)

Five Phase G (and/or Phase F) sherds were found in quantified levels dating to the Early Cuauhnáhuac phase.

The Late Cuauhnáhuac Ceramic Complex

Quantified deposits dating to the Late Cuauhnáhuac phase include units 1, 2, 3, and 4; a total of 813 sherds were recovered from these levels. Descriptive classes for the Early Cuauhnáhuac complex are shown in Table 66.

Cooking Vessels (A)

Comals (A.1; n=19)

Paste.--Buff paste is more common than orange paste in the Late Cuauhnáhuac comals, and as in the previous phase, most sherds have medium texture. However, the comals of this period have the lowest proportion of "hard" paste of any ceramic complex (26.3%), and the frequency of fully oxidized paste is down from the prior phase (see Table 67).

Surface.--There is a dramatic decline in the numbers of orange and brown slipped comals from the previous complexes. Unslipped sherds represent the most common category, while black slip has increased in numbers to

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TABLE 66

DESCRIPTIVE CLASSES FOR THE LATE CUAUHNAHUAC COMPLEX

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	A. Cooking Vessels				
A.1	Comal	19	19	-	31
A.2	Basin	2	2	-	9
A.3	Plain Olla	28	25	3	452
	B. Storage/Transport Vessels				
B.1	Plain Olla (see Class A.3)				
B.2	Tlahuica Polychrome Olla	2	-	2	-
B.3	Miscellaneous Decorated Olla	7	1	6	-
	(total decorated ollas)	9	1	8	-
	C. Serving Vessels				
C.1	Plain Bowl	68	67 (1)[b]	1	123
C.2	B-4 Polychrome (Tlahuica)	10	5	5	-
C.3	Teopanzolco Imports	1	-	1	-
C.4	Related Polychrome	2	2	-	3
C.5	Guinda	6	3	3	-
C.6	Toluca Red-on-White	1	1	-	-
C.7	Morelos-Puebla Black-on-Orange	1	1	-	-
C.8	Incised Redware	1	-	1	-
C.9	Red-on-Buff	2	1	1	-
C.10	Other Decorated	2	1	1	-
C.11	Eroded Decorated Bowls	5	2	3	-
	(total decorated bowls)	31	16	15	3

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TABLE 66 (continued)

	Descriptive Class	Sherds with attribute data			Additional[a] sherds
		Total	Rims	Bodies/ Appendages	
	D. Special Purpose Vessels and Other Ceramic Artifacts				
D.1	Texcoco Fabric Marked	-	-	-	1
D.2	Texcoco Molded/Filleted	-	-	-	11
D.3	Incensario	-	-	-	8
D.4	Spindle Whorl	-	-	-	1
D.5	Figurine	-	-	-	1
	E. Non-Postclassic Sherds				
E.	Non-Postclassic Sherds	-	-	-	16
TOTAL COUNTS (Total sherds: 813)		157	130	27	656

Notes:

[a]This category represents sherds from quantified levels that were sorted and studied in a preliminary fashion, but not subjected to detailed attribute analysis.

[b]Figures in parentheses represent the number of vessels from burials or other special deposits included in the rims category.

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TABLE 67

PLAINWARE PASTE MODES OF THE LATE CUAUHNAHUAC COMPLEX

Dimension	Comals		Basins		Ollas		Bowls	
	N	%	N	%	N	%	N	%
Color								
1. Orange	7	36.8	2	100.0	13	48.1	47	69.1
2. Orange-Buff	-	-	-	-	1	3.7	-	-
3. Buff	10	52.6	-	-	9	33.3	15	22.1
4. Brown	-	-	-	-	-	-	-	-
5. Grey	-	-	-	-	-	-	1	1.5
6. Black	2	10.5	-	-	4	14.8	5	7.4
Texture								
1. Very Fine	-	-	-	-	-	-	-	-
2. Fine	1	5.3	-	-	-	-	39	57.4
3. Medium	13	68.4	-	-	6	22.2	25	36.8
4. Coarse	5	26.3	2	100.0	19	70.4	4	5.9
5. Very Coarse	-	-	-	-	2	7.4	-	-
Hardness								
1. Normal	14	73.7	2	100.0	25	92.6	62	91.2
2. Hard	5	26.3	-	-	2	7.4	6	8.8
3. Soft	-	-	-	-	-	-	-	-
Oxidation[a]								
1. Complete	8	47.1	2	100.0	16	69.6	37	58.7
2. Partial	-	-	-	-	5	21.7	22	34.9
3. Slight	9	52.9	-	-	2	8.7	4	6.3
Number of Sherds	19		2		27		68	

Note: [a]Sherds whose paste color is black are not included in the counts for the oxidation dimension.

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TABLE 68

PLAINWARE SLIP MODES OF THE LATE CUAUHNÀHUAC COMPLEX

Mode	Rims + Appendages		Total Sherds[a]		Burial Vessels[b]	Surface Treatment Index		
	N	%	N	%		Composite[c]	Int.	Ext.
COMAL (total)	19		50					
non-eroded	18	100.0	49	100.0		3.7		
1. unslipped	11	61.1	26	53.1		3.1		
2. orange slip	1	5.6	4	8.2		5.0		
3. brown slip	1	5.6	1	2.0		8.0		
4. black slip	5	27.8	17	34.7		4.0		
5. streaky black slip	-	-	1	2.0		-		
BASIN (total)	2	100.0	11	100.0		-		
1. unslipped	-	-	1	9.1		-		
2. orange slip	2	100.0	9	81.8		-		
3. black slip interior	-	-	1	9.1		-		
OLLA (total)	28	-	479	-				
non-eroded	25	100.0	439	100.0		2.3		
1. unslipped	20	80.0	303	69.0		2.1		
2. orange slip	3	12.0	102	23.2		3.0		
3. brown slip	1	4.0	9	2.1		5.0		
4. black slip	-	-	3	0.7		-		
5. white slip	1	4.0	22	5.0		-		

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TABLE 68 (continued)

	Mode	Rims + Appendages		Total Sherds[a]		Burial Vessels[b]	Surface Treatment Index		
		N	%	N	%		Composite[c]	Int.	Ext.
BOWL	(total)	68		191					
	non-eroded	66	100.0	190	100.0		7.2	7.6	6.7
1.	unslipped	4	6.1	19	10.0		2.8	2.8	2.8
2.	orange slip	27	40.9	98	51.6	1	7.1	8.1	6.0
3.	brown slip	1	1.5	6	3.2		7.5	8.0	7.0
4.	black slip interior	-	-	4	2.1		-	-	-
5.	brown-black slip	33	50.0	61	32.1	10	7.9	7.9	7.9
6.	white slip	1	1.5	1	0.5		5.0	5.0	5.0
7.	other	-	-	1	0.5		5.0	5.0	5.0

Notes:

[a]Total sherds include body sherds not subjected to attribute analysis in addition to the rims and appendages.

[b]This column indicates the number of vessels from burials or other special deposits included in each mode.

[c]The composite surface treatment index is the average of the interior and exterior values (for the bowls and basins).

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TABLE 69

LATE CUAUHNAHUAC COMAL FORMS AND FORM SUBCLASSES

	Subclass	N	%	Constituent Forms
I.	RIM ELEVATION	(18)	100.0	
	1. flat	1	5.6	404(1)[a]
	2.	5	27.8	405(3) 424(2)
	3.	12	66.7	406(1) 411(3) 415(8)
	4. high	-	-	-
	- other forms	1	-	400(1)
	Elevation index (mean): 2.61			
II.	RIM FORM	(13)	100.0	
	1. no ridge	11	84.6	411(3) 415(8)
	4. outcurved	2	15.4	424(2)

Note:

[a]Figures in parentheses represent the number of each form present; underlined forms are unique to the Late Cuauhnáhuac phase.

become the second most common mode; these two finishes together comprise nearly 90% of the Late Cuauhnáhuac comals (Table 68). The degree of polishing is considerably less on both of these finishes, and the overall surface treatment index for the comals is the lowest of any of the phases. As in the prior two phases, black slipped comal rims tend to have higher elevation angles than other examples.

Form.--Late Cuauhnáhuac comal forms are quite limited in their variation (Table 69). Among the 13 non-fragmentary rims, only three separate forms are represented. Form 424 is the only outcurved comal form encountered at Xochicalco (other examples are known from Coatetelco and Teopanzolco, however; see Smith n.d.). One example (Figure 45,A) has a diameter of 30 cm; one other comal (Form 424) has a 32 cm diameter. Form 415 (Figure 45,B,C), while not unique to this phase, is the most common form, with eight examples. The trend in comal rims toward forms lacking ridges at the exterior rim/body juncture reaches a peak in the Late Cuauhnáhuac comals, where such rims comprise 84.6% of the non-fragmentary comals (Table 69). The trend toward flatter comals, as measured by a decreasing Elevation index, is reversed slightly; the Index has risen from 2.44 to 2.61.

Basins (A.2; n=2)

The two basin rims have fully oxidized medium texture orange paste (Table 67). Their interior and exterior surfaces are orange slipped, as are those of seven of the nine basin bodies; one unslipped and one black slipped interior body are also present. Both basin rims are fragmentary in form (Form 205).

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Figure 45. Ceramics of the Late Cuauhnáhuac Complex. A-C, comals, A (3-41, 424), B (3-42, 415), C (4-32, 415); D-G, ollas, D (3-15, 111), E (3-1, 138), F (2-1, 116), G (3-10, 125).

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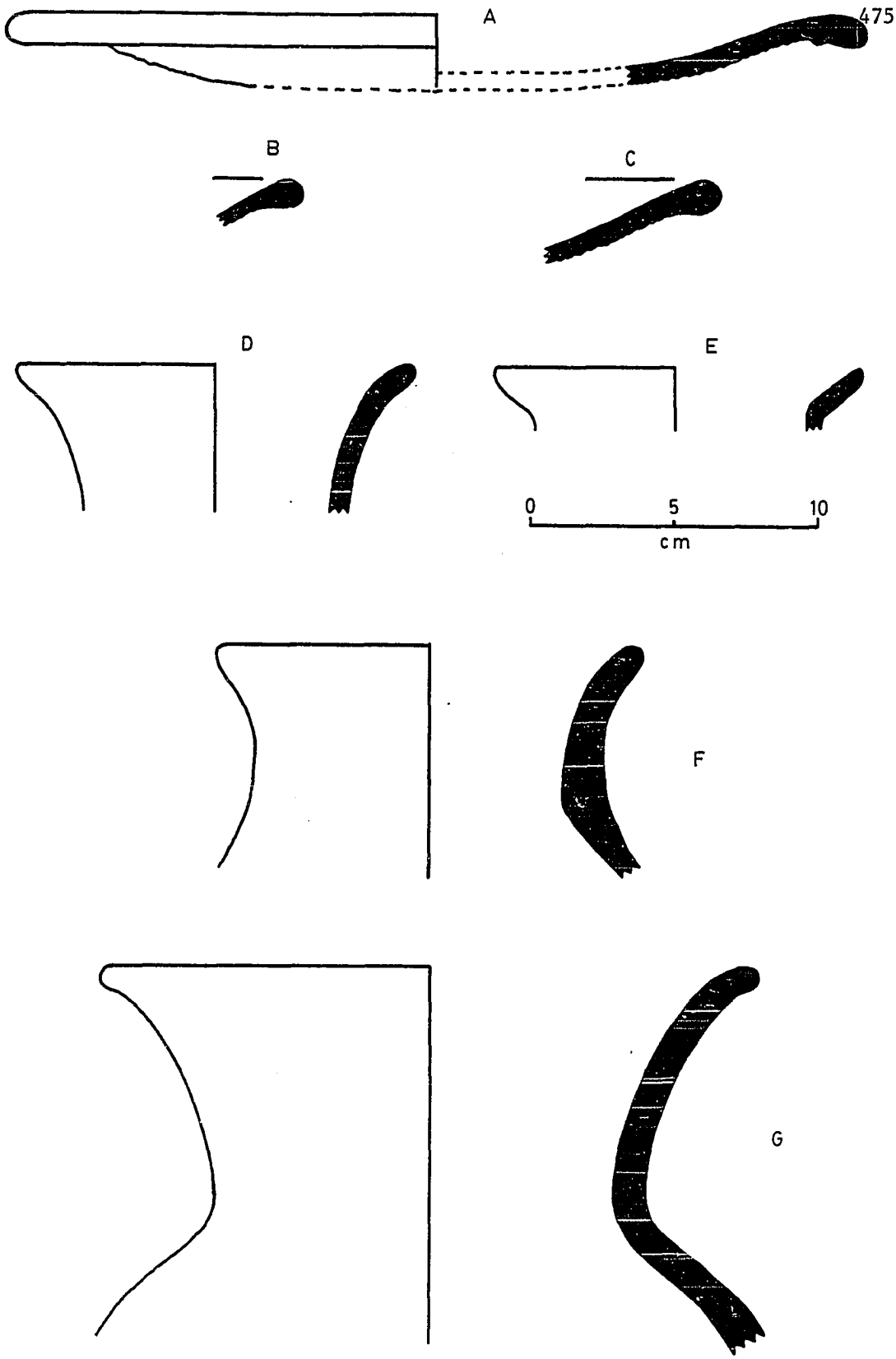

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Plain Ollas (A.3; n=27)

Paste.--Orange paste slightly outnumbers buff paste in the plain ollas (Table 67). In contrast to previous phases, coarse paste is now the most common texture mode. Most ollas are fully oxidized, and only two exhibit "hard" paste.

Surface.--There is a dramatic decrease in brown slip, previously the most common mode; here it comprises only 2.1% of all olla surfaces. The unslipped mode is by far the most popular, and together with orange slip comprises over 90% of the Late Cuauhnáhuac ollas. There is a greater proportion of white slipped ollas (probably not polychrome) than in any previous complex. Surface treatment is the poorest of all phases. The low Surface Treatment Index (2.3) is due partly to the preponderance of unslipped ollas coupled with the tendency of these sherds to be even less highly polished than unslipped ollas in previous phases.

Form.--Eight non-fragmentary olla rims were recovered from Late Cuauhnáhuac deposits, comprising seven distinct forms (Table 70). The degree of curvature of the rims, as measured by the Curvature Index, has stabilized since the last phase, but the Neck Height Index has reversed itself, making a return to predominantly high-necked forms. An unusually high number of large rim sherds were recovered, yielding a total of eleven diameter measurements (Table 70). Four of these large rims are illustrated in Figure 45,D-G; the latter three are forms unique to the Late Cuauhnáhuac phase.

Discussion.--Data bearing on olla function were presented in Table 59 under the Early Cuauhnáhuac phase. As in that complex, support for the hypothesized functional relationships is quite equivocal. Slipped ollas

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TABLE 70

PLAIN OLLA FORMS AND FORM SUBCLASSES OF THE LATE CUAUHNAHUAC COMPLEX

	Subclass	N	%	Constituent forms
I.	RIM CURVATURE	(23)	100.0	
	1. vertical	-	-	-
	2.	2	8.7	111(2)
	3. moderate	8	34.8	106(7) 116(1)
	4.	6	26.1	105(5) 125(1)
	5. outcurved	7	30.4	104(5) 127(1) 129(1)
	- other forms	2	-	133(1) 138(1)
	Curvature index (mean):	3.78		
II.	NECK HEIGHT	(6)	100.0	
	1. short	-	-	-
	2. medium	2	33.3	116(1) 127(1)
	3. high	4	66.7	111(2) 125(1) 129(1)
	Height index:	2.67		

III. RIM DIAMETER

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
X	X	X		X			X X	X		X	X X			X	

have only a slightly higher Surface Treatment Index than unslipped ollas, and this difference is exceeded by that of the bowls (see Table 68). Only two handles were recovered; both are horizontal, one is slipped and the other unslipped. There does exist a tendency for unslipped rim diameters to be larger than slipped examples, but it is not a strong tendency. In sum, the data bearing on plain olla function in this phase must be considered equivocal.

Storage/Transport Vessels (B)

Plain Ollas (B.1; n=27)

See the discussion under section A.3 above.

Tlahuica Polychrome Ollas (B.2; n=2)

See the discussion under the Temazcalli complex.

Miscellaneous Decorated Ollas (B.3; n=7)

These seven sherds all have eroded red or black on white surfaces. One fragmentary rim (Form 105) is included, and no handles are present.

Serving Vessels (C)

Plain Bowls (C.1; n=68)

Paste.--Orange paste outnumbers buff paste by three to one in the Late Cuauhnāhuac plain bowls. A higher proportion of sherds with fine texture are represented than in previous phases, and most examples are fully oxidized (Table 67).

Surface.--Fifteen of the 22 Postclassic bowl surface finish categories are represented in the present complex. Their grouping into

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seven modes is shown in Table 71. As in the previous phase, the mottled brown and black smudge surface finishes are combined in the brown-black mode because of their similar scores on other attributes. The seven modes and their frequencies are listed in Table 68. Compared to the Early Cuauhnáhuac plain bowls, the orange slip and unslipped modes have remained at a constant level, while the brown slip and black slip interior finishes decline considerably to become minor categories. The brown-black mode shows a large increase, due in part to the inclusion of ten partial or complete vessels from Cache 1 in Excavation B. Although unslipped bowls exhibit a decline in their degree of polishing, the various slip modes remain fairly highly polished. Brown-black bowls continue to be the most highly polished class, and the increase in their frequency leads to a slight rise in the overall Surface Treatment Index from 7.0 to 7.2.

Form.--Late Cuauhnáhuac plain bowl forms are virtually identical to those of the Early Cuauhnáhuac phase (Table 72). Hemispherical and conical forms together comprise over 85% of the non-fragmentary rims, and the rest are spread among the other form subclasses. The only change from the preceding phase is a lack of incurved forms. The brown-black class, which comprises almost half of the plain bowl rims, is composed primarily of hemispherical (n=16), conical (n=12) and miniature (n=3) forms, although one straight flaring rim (Form 323) is also present. All of the 10 brown-black bowls recovered in the Excavation B cache have conical forms, with Form 318 (n=6) predominating over 317 (n=1). In contrast to the Early Cuauhnáhuac brown-black class, Late Cuauhnáhuac diameters are highly variable and lack the bimodal distribution found in the earlier phase (see Table 73). There is still a size mode at 20 cm, and the presence of

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TABLE 71

SURFACE FINISH MODES OF LATE CUAUHNAHUAC PLAIN BOWLS

Interior \ Exterior	No Slip	Or.	Brn.	Blk.	Mott. Brn.	Smudge	White	Other	TOTAL
Un-slipped	4/19[a]	1/4							
Orange	2/9	24/85	1/6		1/3	1/1			
Brown									
Black	-/2	-/2							
Streaky Black									
Mottled Brown		3/5			22/35				
Smudged Black					1/1	5/16			
White							1/1		
Other								1/1	
TOTAL									67/190

[a]Entries list counts of rims and body sherds, separated by a slash.

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TABLE 72

PLAIN BOWL FORMS AND FORM SUBCLASSES OF THE LATE CUAUHNAHUAC COMPLEX

Subclass	N	%	Constituent Forms	Eroded Bowls	
				N	Forms
3. Hemispherical	35	58.3	315(35)	2	315(2)
4. Conical	17	28.3	317(1) 318(6) 319(10)	-	
5. Straight	1	1.7	323(1)	-	
6. Everted	1	1.7	331(1)	-	
7. Recurved	2	3.3	338(1) 339(1)	-	
8. Miniature	3	5.0	520(3)	-	
9. Other	1	1.7	301(1)	-	
Non-fragmentary rims	60				
Fragmentary rims	5		300(2) 305(2) 306(1)		
Eroded rims	2				
Total Bowl Rims	67				

the miniature form implies size measurements around 7 or 8 cm, but bowls with 13, 16 and 24 cm diameters indicate the lack of a clear bimodal distribution. Three of the brown-black forms from Cache 1 are illustrated in Figures 46,A-C; a hemispherical orange slipped bowl is also shown for comparison (Figure 46,D). Five of the brown-black bowls have a raised base, and one brown-black miniature bowl support was also recovered in Late Cuauhnáhuac deposits.

B-4 Polychrome (C.2; n=10)

See discussion under the Early Cuauhnáhuac complex.

Imports from the Teopanzolco Ceramic Complex (C.3; n=1)

One body sherd of Tlahuica Polychrome type A-2 was recovered in Late Cuauhnáhuac levels; this almost certainly represents redeposition of earlier material.

Other Related Polychrome (C.4; n=2)

A number of sherds representing at least two vessels with unusual polychrome decoration were recovered in Late Cuauhnáhuac deposits. A reconstruction of one of these vessels is shown in Figure 46,E. The decoration does not qualify for inclusion in the Tlahuica Polychrome class (because of the lack of thin black lines), but does resemble both Tlahuica Polychrome and Malinalco Polychrome on a general level. These two vessels represent Form 336, which is rare in western Morelos, and both appear to be the same size (diameter of 14 cm). The paste is a fine textured orange-buff color. The painted exterior surface is burnished, while the interiors are unslipped but polished. Decorated bowls similar to these

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Figure 46. Ceramics of the Late Cuauhnáhuac Complex. A-C, brown-black bowls, A (80-5, 317), B (80-6, 319), C (80-1, 318); D, orange slipped bowl (3-25, 315); E, unusual polychrome bowl (3-63, 336); F, unusual decorated bowl (4-39, 326).

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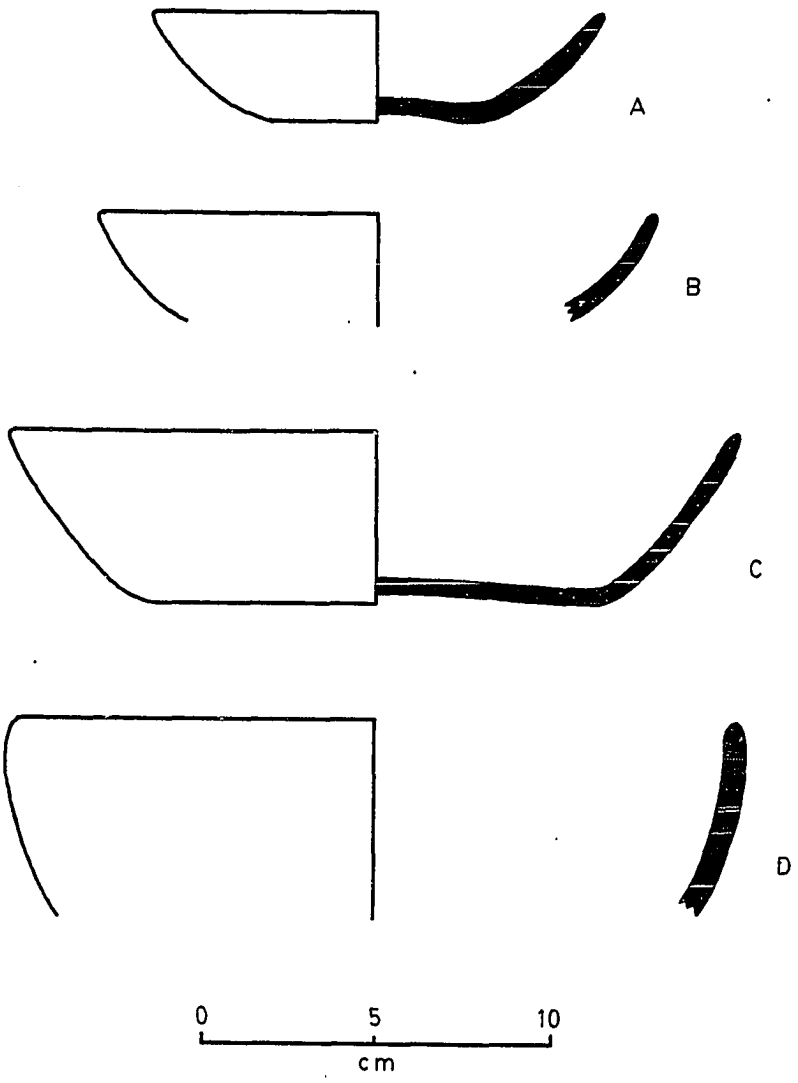

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examples are not reported in the literature, and they may represent a local version of the general black and red on white polychrome technique of Postclassic central Mexico.

Guinda (C.5; n=6)

Only six Guinda sherds are present in the Late Cuauhnáhuac deposits. Their paste is variable (3 orange; 1 orange-buff; 2 buff), while surface finish is more uniform. All sherds have Guinda interiors, and all but one have unslipped exteriors. Three rims are present; two are hemispherical bowls (Form 315), and one is a plato (Form 368). All six sherds are small and none are illustrated.

Toluca Red-on-White (C.6; n=1)

One fragmentary rim (Form 305) of this class was encountered in Late Cuauhnáhuac levels. It has medium orange paste, is painted on both surfaces, and probably represents redeposition activities.

Morelos-Puebla Black-on-Orange (C.7; n=1)

One rim of this class was recovered in Excavation B (see Figure 41,E); it probably represents redeposition of earlier material.

Incised Redware (C.8; n=1)

See discussion under the Temazcalli complex. This sherd may represent redeposition, or it may pertain to the Late Cuauhnáhuac phase.

Red-on-Buff (C.9; n=2)

Two small sherds decorated in red on an unslipped buff surface were recovered. They are painted on both interior and exterior surfaces, and have medium buff paste.

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Other Decorated Bowls (C.10; n=2)

This class consists of two distinct decorated bowl sherds that do not fit any other decorative class. The first is a body sherd painted in black stripes on an orange slipped (interior) surface. The decoration does not appear to resemble that of the Morelos-Puebla Black-on-Orange class, and could represent a local imitation of Aztec III Black-on-Orange painting; the sherd is small, however, and no firm interpretation can be made.

The second decorated sherd in this category is illustrated in Figure 46,F. It is an everted rim bowl with interior and exterior decoration in dark red or maroon on a white background. The vessel wall is relatively thin, and the paste is very hard, medium textured, and grey in color. This sherd is unique; the closest resemblance is with the Wavy Line Red-on-Cream class (in terms of the vessel form and general design style), but the sherd is clearly not a member of that class.

Eroded Decorated Bowls (C.11; n=5)

These five sherds have eroded or fragmentary decoration in red and/or black on a white surface. Four are decorated on the exterior and one on the interior. Paste is variable. Two rims are present, representing Forms 320 and 327.

Serving Vessels: Summary of Forms

Locally made bowls again show less diversity than the previous phase, with only 14 distinct forms represented (Table 73). Hemispherical and conical forms continue to dominate the bowls at the same frequency as the previous two phases (48.7% and 23.7% respectively). A number of

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TABLE 73

BOWL FORMS BY DECORATIVE CLASS, LATE CUAUHNAHUAC COMPLEX

Form Subclass	Form	LOCAL					IMPORTED				TOTAL
		C.1 Plain	C.2 B-4	C.4 Related Polychrome	C.5 Guinda	C.9 Red-on-Buff	C.11 Eroded Decorated	C.6 Toluca Red-on-White	C.7 Morelos-Puebla	C.10 Other Decorated	- Eroded Bowls	
HEMI-SPHERICAL	315	35			2						2	39
CONICAL	317	1										19
	318	6										
	319	10	1									
	320						1					
STRAIGHT	322		1									2
	323	1										
EVERTED	326									1		3
	327						1					
	331	1										
RECURVED	334		3									8
	336			2					1			
	338	1										
	339	1										

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TABLE 73 (continued)

Form Subclass	Form	LOCAL						IMPORTED				TOTAL
		C.1 Plain	C.2 B-4	C.4 Related Polychrome	C.5 Guinda	C.9 Red-on-Buff	C.11 Eroded Decorated	C.6 Toluca Red-on-White	C.7 Morelos-Puebla	C.10 Other Decorated	- Eroded Bowls	
MINIATURE	520	3										3
OTHER	301	1				1						2
FRAGMENTARY	300	2										6
	305	2						1				
	306	1										
PLATO	368				1							1
TOTAL		65	5	2	3	1	2	1	1	1	2	83

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TABLE 74

BOWL RIM DIAMETERS OF THE LATE CUAUHNAHUAC COMPLEX

	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eroded Decorated						X											
Other Related Polychromes							X X										
B-4 Polychrome										X		X X					
Other Plain Bowls	X												X	X			
Brown-Black Bowls	(X)[a]					X			X			X	X X X X X	X	X		X

(centimeters)

Note: [a]Diameter inferred from miniature form; no actual measurement made.

associations previously noted between form and decorative class continue in the Late Cuauhnáhuac phase: miniature forms occur only in plain brown-black bowls, platos are found locally only in the Guinda class, and Form 334 occurs only in B-4 Polychromes. The paucity of imported bowl rims makes comparison difficult; furthermore, two of the three examples probably represent earlier material redeposited in Late Cuauhnáhuac contexts.

The bowl rim diameters of this phase (Table 74) show an interesting pattern. As noted above, the strongly bimodal size distribution of Early Cuauhnáhuac brown-black bowls breaks down, and there are a number of diameters falling well away from the two earlier modes. Only three non-brown-black plain bowl diameters are available; two fit the normal large bowl size while one is quite small at 8 cm. The three B-4 Polychrome measurements are somewhat smaller than the one 23 cm determination of the prior phase. Finally, the three measurements from other decorated classes ("Eroded Decorated" and "Related Polychrome") cluster at the 13-14 cm size.

Special Purpose Vessels and Other Ceramic Artifacts (D)

Texcoco Fabric Marked (D.1; n=1)

See the discussion under the Tilancingo complex.

Texcoco Molded/Texcoco Filleted (D.2; n=11)

See the discussion under the Early Cuauhnáhuac complex.

Incensarios (D.3; n=8)

These are large coarse incensarios without deep incisions. See the discussion under the Temazcalli complex.

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Spindle Whorls (D.4; n=1)

One small (cotton) spindle whorl was recovered from Late Cuauhnáhuac levels, and an additional example comes from the mixed Phase G/Late Cuauhnáhuac deposits below the plaza floor in Excavation B (unit X-232). This latter whorl probably pertains to the present phase given its resemblance to Postclassic spindle whorls. See the discussion of spindle whorls under the Temazcalli complex.

Figurines (D.5; n=1)

One small fragment of a figurine was recovered in Late Cuauhnáhuac levels.

Non-Postclassic Sherds (E; n=16)

A relatively large number of non-Postclassic sherds was recovered in Late Cuauhnáhuac deposits; most appear to date to Phase G. The presence of this material in Excavation B probably relates to the Phase G deposits under the plaza floor. Although the plaza most likely dates to the Temazcalli or possibly Early Cuauhnáhuac phase, pits of the Late Cuauhnáhuac phase cut through the floor in several places.

Postclassic Ceramics at Xochicalco: Economic Implications

When all of the Postclassic ceramic complexes of Xochicalco are viewed together, several characteristics stand out. First, the five form classes defined at the beginning of the chapter are quite distinct in many ways. In terms of paste, while the form classes are not clearly associated with paste color or with the paste groups defined by petrographic analysis (Cyphers 1982), they do exhibit consistent differences in paste texture and

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hardness. Comals, bowls, and platos all tend to have paste of fine to medium texture, while ollas and basins have medium to coarse texture paste. On the informal "hardness" scale employed, most comals have "hard" paste while the remaining form classes all tend to have "normal" paste with very few examples of the hard attribute. These differences probably relate to the functional distinctions between the various form classes. The tests of olla function tend to support the hypothesized cooking/ storage and transport distinction for the Tilancingo and Temazcalli complexes, while the results for the Early and Late Cuauhnáhuac complexes are somewhat equivocal. With greater attention to functional analysis of archaeological pottery (see Lischka 1978; Shepard 1963), problems like these should become increasingly amenable to solution and then integration with other studies of prehistoric production and distribution systems.

The form classes exhibit definite associations with specific modes of surface finish (beyond the issue of whether the interior, exterior or both surfaces are finished). For example, the brown-black finish is used only on bowls; comals never have a white slip; comals and basins are never painted; and so on. As mentioned above, appendages are strongly associated with form class: comals have none; basins have horizontal handles; ollas have horizontal or vertical handles; some bowls have supports; and all platos have supports. However, the biggest distinction among the form classes is in the rim form; with the exception of a very few outcurved bowls which may in fact be ollas, there is virtually no overlap in the rim form among the different classes (see Appendix A).

These strong distinctions and associations at the level of form classes are not matched within those classes, however. As the ceramic

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descriptions indicate, each form class exhibits considerable variability in the dimensions of form, size, paste and surface, but there are few significant associations between these dimensions. The only culturally significant variability within the form classes appears to concern bowl and olla size modes and the decorative classes. While the decorative classes exhibit some variation in paste and surface treatment, the painted designs, decorative fields and colors used are highly standardized, and only a limited repertoire of forms is found associated with each class.

These observations suggest the following interpretations. First, the distinctiveness of the form classes, their non-random association with a number of dimensions, and their persistence through time suggest that they represent important cultural categories in all of the Postclassic phases at Xochicalco. Second, this same distinctiveness may argue for specialized manufacture of the different plainware form classes (see below), but the variability of form, slip and treatment within these classes indicates that they were probably not mass-produced under direct state supervision (see Blanton et al. 1981:105f). Third, the high degree of standardization of most of the decorated ceramics argues strongly for their specialized production, with different specialists (probably in different places) making the different decorative classes. Although central Mexican ethnohistorical sources on the whole are nearly silent on the issue of ceramic production, Sahagún (1950-69, bk. 10) does provide some information on ceramic specialization that may help evaluate the nature of ceramic production in Postclassic Morelos.

The passages in Sahagún dealing with ceramic production are reviewed by Branstetter-Hardesty (1978) as part of her larger treatment of

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ethnohistorical sources bearing on Prehispanic central Mexican ceramics (1978:20-56). However, this material is worth examining again, because Branstetter-Hardesty fails to appreciate the high degree of specialization implied in Sahagún's accounts. First, pottery-manufacture is included as a separate category in Chapter 12 (Sahagún 1950-69, bk. 10: 41-43), which consists of a list of the major "ways of gaining a livelihood" in Prehispanic Mexico. These occupational categories are: rich man, farmer, horticulturalist, merchant, and potter (suquichiuhqui). They do not represent distinct occupations or specializations but rather general classes of occupations; there are many kinds of rich men, farmers, horticulturalists, merchants and potters, each described in more detail elsewhere in Sahagún. Thus Chapter 23 is devoted to "the olla makers [conchiuhque], the clay workers [suquichiuhqui], and the makers of large baskets and of small baskets" (p. 83). In this chapter, two categories of occupation relating to ceramics are discussed. The clay worker is described as "a dealer in clay objects, sells ollas, cooking ollas, water jars, large pitchers . . . and many other ceramic" items. Next, the "griddle maker" (comalnamacac) is described as

> one who moistens clay, kneads it, tempers it with (soft pieces of) reed, makes it into a soft paste. He moistens (the clay), tempers if with (soft pieces of) reed, kneeds it. He makes griddles; he beats (the clay), flattens it, polishes it, smooths it; he applies a slip. He places (the unfired pieces) in the oven; he feeds the fire, makes the oven smoke, cools the oven.
>
> He sells hard-fired (griddles) which ring, (which are) well tempered, (as well as those which are) poorly fired, smudged, blackened, discolored, poorly made, inferior, sounding as if cracked--cracked in firing (Sahagún 1950-69, bk. 10:83).

In summary, Sahagún describes a general potter who sells many kinds of ceramic vessels and a specialized comal maker who does nothing but make and sell comals. An olla specialist, denoted by a specific term,

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is listed in the introduction to Chapter 23, but is not described. Furthermore, the "clay worker" is described in Chapter 12 not as a single occupation but as a class of occupations which, like the merchants and other occupational classes of Chapter 12, is further subdivided into specialists. This picture suggests a highly specialized and elaborate ceramic industry in the Late Postclassic Basin of Mexico. On this basis, it is difficult to see how Branstetter-Hardesty arrives at the following interpretation: "It seems reasonable to suggest that the craft [pottery] was practiced to a greater or lesser extent by individuals and family groups in almost every village of every size as it is today in Mexican towns which still produce pottery" (1978:29). This statement is completely unwarranted, and goes against Branstetter-Hardesty's own data and discussion of ceramic specialization by town and by district within larger cities (1978:26ff). Furthermore, there is not any area of Mexico today where ceramic manufacture is found "in almost every village of every size"; contemporary pottery making is almost always limited to a small number of towns in any given region (Edson 1979; Shepard 1963). In conclusion, Sahagún's account indicates that ceramic production in the Late Postclassic Basin of Mexico was carried out by specialists, each making a separate form class (at least for ollas and comals), and trading their vessels (both high quality and low) in the market.

The Basin of Mexico in Late Postclassic times was more advanced economically than Morelos in terms of the level of commercialization and intensity of market activity (Smith 1982), but it would not be surprising if a similar degree of specialization in ceramic production existed in the two areas. The manufacture of the different form classes recovered

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at Xochicalco by specialists producing for a competitive market would account for the observed patterns of ceramic variability. Information on Prehispanic markets in Morelos is scanty (due to the general lack of early Colonial documentation), but it is probably significant that virtually every town or city for which some sixteenth century documentation exists is said to have contained a marketplace (e.g. Relación de Tepoztlan 1905: 250; Relación de Totolapan 1905:11; Títulos de Cuernavaca 1947:218, 219). Given the functional relationship between market systems and specialized production in state societies (e.g. Cook and Diskin 1976; Earle 1981; Shepard 1963; Smith 1979b), the above reconstruction is not at all unreasonable.

In order to fully investigate questions of ceramic function, specialized production, and exchange mechanisms and their relationship to political institutions, regional data are needed for each time period involved (see Blanton et al. 1981:30,81,105f; Shepard 1963; Earle 1981; Smith 1979b). While such data are presently lacking for most of Morelos, a consideration of the variability in the Postclassic ceramic complexes of Xochocalco does suggest the existence of similar patterns of ceramic specialization and market exchange in each of the Postclassic phases. Nevertheless, there are significant changes in both plain and decorated ceramics through the Postclassic sequence. An examination of these changes and their implications for cultural development is presented in the following chapter.

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CHAPTER 7

ARCHAEOLOGICAL AND HISTORICAL SYNTHESIS

Dating the Ceramic Sequence

The purpose of this section is to assign calendar dates to the ceramic phases described in Chapter 6. Because of the lack of radiocarbon, obsidian hydration, or other chronometric dates for the Xochicalco Postclassic phases, the sequence must be dated through comparison with other central Mexican Postclassic chronologies. However, the lack of reliable dates from Morelos is echoed throughout Postclassic central Mexico, where all of the existing ceramic sequences must be seen as tentative. It may therefore seem unwise to assign specific calendar dates to the Postclassic phases of Xochicalco. Nevertheless, such dates are needed in order to correlate the archaeological sequence with the historical chronology established in Chapters 2 and 3. For this reason, estimates of the beginning and ending dates of the ceramic phases are made for purposes of correlation. It must be emphasized that these dates represent only the best current approximation of the actual dates for phases and not a final judgment concerning absolute time in Postclassic Morelos; no archaeological chronology is ever final, and the dates are hypotheses subject to change with future developments.

Central Mexican Postclassic Chronologies

The proposed dating of the Xochicalco sequence is given in Table 75 along with comparative central Mexican Postclassic sequences. Before

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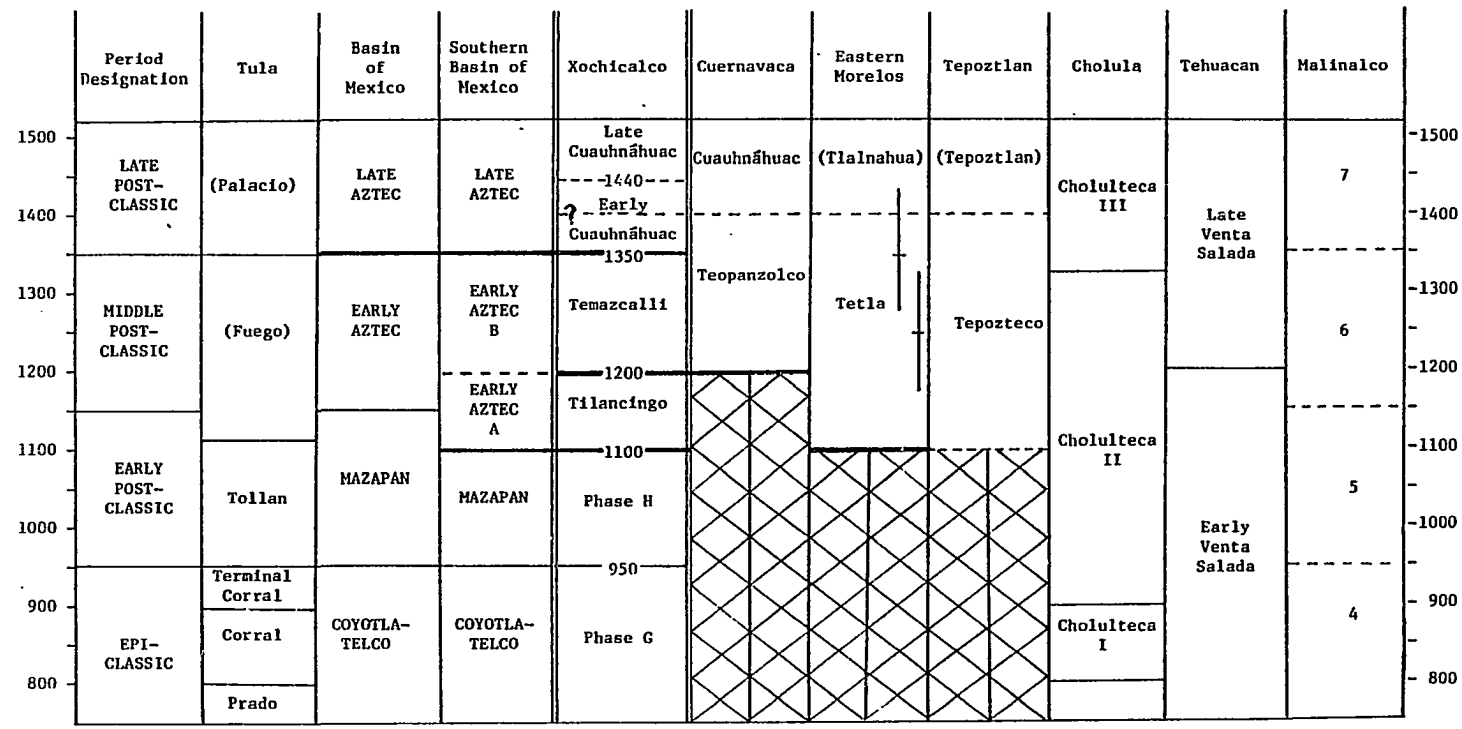
TABLE 75

POSTCLASSIC CHRONOLOGY CHART[a]



Note:

Dashed horizontal lines indicate period changes whose dating is especially tentative. The heavy horizontal lines link the Xochicalco phases with other closely related contemporaneous phases. Ceramic complexes in parentheses have been proposed but not fully isolated or described in the literature. The two radiocarbon dates from Tetla are indicated with one standard deviation. The hatched area indicates the present lack of information on ceramics or cultures prior to the Middle Postclassic period in most of Morelos. Citations, justifications, and discussions of the various sequences are given in the text.

addressing the Xochicalco chronology, some words should be said about the construction of this table and the various regional sequences depicted. The period designations in the first column are intended for use in comparisons between regions and carry no implications of developmental stages. The sources and nature of the regional sequences depicted are briefly outlined below.

1. Tula: The Tula sequence is described in Cobean (1978). The Fuego and Palacio phases are listed in his Figures 3 and 4, but are not included in the ceramic descriptions (1978, Chapter 6); these complexes apparently await isolation and description.

2. Basin of Mexico: The sequence is taken from Sanders, Parsons and Santley (1979:457-474), who substitute the following period names: Second Intermediate Phases One, Two and Three, and Late Horizon. I prefer the traditional period names for reasons set out in Chapter 1. It may be noted that several of the phase dates given with their ceramic descriptions (pp. 435-474) do not match those presented in a chronological chart (p. 93). I follow the former in placing the start of the Late Aztec period at 1350 (pp. 466f) rather than 1400 as given in the chart on page 93.

3. Southern Basin of Mexico: This column represents my revision of the Early Aztec period in the southern Basin of Mexico; this is explained below.

4. Cuernavaca: See below and Smith (1981a, 1981b, n.d.).

5. Eastern Morelos: Ceramics of the Tetla complex are described in Norr (n.d.), who discusses the two radiocarbon dates shown in Table 75 here. These dates, from the context of a housefloor at Tetla, are 595 ± 75

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(ISGS-509) and 700 ± 75 (ISGS-508). The Tlalnahua ceramic complex was proposed to cover the Late Postclassic period in eastern Morelos on the basis of several distinctive classes present in material excavated from Las Pilas and Olintepec by Guadalupe Martinez and Wanda Tommasi respectively (see Smith 1981a, 1981b). This complex has yet to be fully isolated and described, however.

6. Tepoztlan: See below and Smith (1981a, 1981b, n.d.).

7. Cholula: These dates are taken from Muller (1978a:87,97,109). Her assignment of the Cholula Polychrome ceramics to the Cholulteca III phase exclusively (pp. 113ff) is almost certainly incorrect. On the basis of comparative evidence, it has been suggested that these ceramics have a twelfth century origin date at Cholula (Smith and Heath-Smith 1980:35-37); this is consistent with the findings of the present work. Therefore, revision of the Cholula chronology is called for; perhaps splitting the Cholulteca II phase in half, with the polychromes starting the second half, would be appropriate. However, with the lack of published stratigraphic or other supporting data for the Cholula chronology, independent reanalysis of the situation is impossible.

8. Tehuacan: This sequence is taken from MacNeish, Peterson and Flannery (1970:177-237). Sisson (1981) reports a presumably Late Postclassic occupation at Coxcatlan in the Tehuacan Valley. He does not discuss chronology, however, and it is not certain whether his archaeological data pertain to all 320 years of the Late Venta Salada phase or to a shorter Late Postclassic facet. He mentions the presence of "Aztec Black-on-Orange" pottery, but does not identify the variety; MacNeish et al. (1970:Figure 137)

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illustrate two sherds of Aztec III Black-on-Orange from Tehuacan, but mistakenly identify it as "Tenayuca" (i.e. Aztec II) Black-on-Orange. The published record on the Postclassic period in the Tehuacan Valley is thus quite confusing and further refinement of the coarse-grained sequence is urgently needed.

9. Malinalco: The phase numbers are taken from Galvan (1974/75), but I have changed their dating. Galvan dates Phase 5 through 9 at 900-1300; 1300-1450; and 1450-1519. My revision of the sequence (accepting his phase definitions) is based upon the following diagnostic classes found in the Postclassic levels (1974/75:Cuadros 1 and 2). Phase 5 marks the start of Toluca Red-on-White (see discussion in Chapter 6 above), and contains sherds of Mazapan red on buff. The former continues into Phase 6, which is characterized by the start of Malinalco Polychrome and the presence of a number of Middle Postclassic types: Guinda, Chalco-Cholula Polychrome, Texcoco Fabric Marked, and Aztec Black-on-Orange (Galvan notes the presence of both the Aztec II and Aztec III varieties but does not distinguish them in his charts; presumably the Phase 6 examples are Aztec II). In Phase 7, the Malinalco Polychrome, Guinda and Texcoco Fabric Marked classes continue, and Texcoco Molded is added. Aztec Black-on-Orange (presumably Aztec III) is also found in these levels.

Middle Postclassic Central Mexico: Dating the Tilancingo and Temazcalli Phases

In the current view of Early Aztec period ceramics in the Basin of Mexico, the Aztec I and Aztec II Black-on-Orange types are seen as largely contemporaneous with distinct spatial distributions (Parsons 1976:96;

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Sanders, Parsons and Santley 1979:466f; Whalen and Parsons n.d.). The geographical centers of distribution are reflected in the names given to these ceramic classes over three decades ago: Aztec I, called "tipo Culhuacan" (Griffin and Espejo 1950:118ff), is common in the southern Basin of Mexico from Culhuacan to Chalco, and Aztec II, known as "tipo Tenayuca" (pp. 132ff), appears to be centered in the Tenayuca region in the west central portion of the Basin. The association of other ceramic classes with these types (e.g. Incised Guinda with Aztec II and Graphite Guinda with Aztec I) suggests that Tenayuca and Culhuacan represent the centers of contemporaneous ceramic complexes and perhaps ceramic spheres; there is at present insufficient published evidence to fully define these entities, however.

In spite of the overall contemporaneity of these two complexes, however, the Culhuacan complex clearly starts earlier than those Tenayuca markers which are found in the southern Basin of Mexico. This fact, discussed briefly by Whalen and Parsons (n.d.), is based upon stratigraphy at Chalco and Culhuacan. In O'Neill's excavation at the former site, he encountered 4.5 meters of deposits containing Aztec I, Chalco-Cholula Polychrome, Graphite Guinda and Texcoco Fabric Marked underlying two meters of deposits where these classes are joined by Aztec II and Aztec III Black-on-Orange (1962:Table 2). These top two meters probably represent mixed levels resulting from Late Aztec activity that obscured the transition between a late Early Aztec component (with Aztec II) and the Late Aztec component (with Aztec III). A clearer picture emerges at Culhuacan, where Sejourné (1970) reports the results of three excavations. In her Trench 1, the bottom two meters produced Aztec I and Texcoco Fabric

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Marked ceramics, followed by 50 cm to 1 meter of these types plus Aztec II, after which all of them are joined by Aztec III for the remaining top three meters of deposits (1970:Figure 80). In Trench 2, both Aztec I and Aztec II are found through all 6 meters, joined by Aztec III in the top 4.5 meters (Figure 81), while the deposits of Pit 1 mirror the stratigraphy of Chalco; Aztec I and Texcoco Fabric Marked co-occur for 3.5 meters, after which they are joined by Aztec II and III for the top 1.5 meter (Figure 81; Sejourné reports a limited number of types in her tables, not including Graphite Guinda or Chalco-Cholula Polychrome). In summary, excavations at Chalco and Culhuacan suggest that the Early Aztec period in the southern Basin of Mexico may be divided into two facets. The first, called Early Aztec A in Table 75, is characterized by Aztec I, Texcoco Fabric Marked, Graphite Guinda and Chalco-Cholula Polychrome (these latter two may or may not be present at Culhuacan). In the second facet, labelled Early Aztec B, these same traits continue, but are joined by Aztec II pottery and other Tenayuca traits like Incised Guinda (Whalen and Parsons n.d.). In Table 75, I have pushed back the origin of the Early Aztec period to 1100 to allow sufficient time for these developments, and the division between the early and late facets has been arbitrarily set at 1200.

Three of the diagnostic traits of the overall Early Aztec period in the southern Basin of Mexico--Graphite Guinda, Chalco-Cholula Polychrome, and black on orange decoration in the Aztec I style--are also present in the Tetla ceramic complex of Eastern Morelos; the first is quite common, the second is relatively rare, and the third is common, but in the Morelos-Puebla variant (Norr n.d.; Smith n.d.). The two radiocarbon dates for Tetla, shown in Table 75, confirm its chronological alignment with the

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Early Aztec period. These same traits, plus some Aztec I Black-on-Orange imports, are also found in the Tepozteco complex of the Tepoztlan area of Morelos (Smith n.d.), which may therefore be placed in the same time interval. One attribute found on the Black-on-Orange vessels discussed here (both the Aztec I and the Morelos-Puebla variants) is the stamped base (Sejourné 1970: Figures 64-66; Norr n.d.), which is also found in the Early Venta Salada phase at Tehuacan (MacNeish et al. 1970:187-189); similarly, it was noted in Chapter 6 that a characteristic incised hook motif found commonly on Graphite Guinda vessels is also present in the Early Venta Salada phase (MacNeish et al. 1970:205). Because this phase ends at 1200 (1970:Figure 153), the presence of these attributes in the Culhuacan, Tetla and Tepozteco complexes supports an origin date for these three complexes some time prior to 1200, thus strengthening the 1100 date derived above.

Following this reconstruction, the Tilancingo phase at Xochicalco is aligned with the start of these three ceramic complexes (i.e. 1100), based upon the presence of Graphite Guinda, Morelos-Puebla Black-on-Orange and Texcoco Fabric Marked. This date is quite tentative, however, for two reasons. First, all four phases could start well before 1100; this would require a rethinking of the Early Postclassic period in the Basin of Mexico, however. Second, given the presence of Toluca Red-on-White in the Tilancingo complex and its Early Postclassic (Phase 5) origin at Malinalco (see Chapter 6 and the revision of the Malinalco sequence above), this type and the Tilancingo complex could start in western Morelos a century or two prior to 1100, at which time the Basin of Mexico and eastern Morelos/southwestern Puebla imports are added. The Temazcalli complex was originally separated from the Tilancingo complex by the start of the Tlahuica Polychrome style

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(see Chapter 5). This is present in terms of B-4 polychrome bowls (n = 16), Tlahuica Polychrome Ollas (n = 12), and Teopanzolco imports (n = 20). Therefor, the Temazcalli and Teopanzolco complexes probably originate at approximately the same time. For the duration of the Teopanzolco phase (overlapping both the Temazcalli and Early Cuauhnáhuac phases), its imports are quite common at Xochicalco, and if it had started earlier than the Temazcalli phase, its imports would be expected in Tilancingo deposits.

In contrast to the Tetla and Tepozteco complexes, which are closely related to the Culhuacan complex of the Basin of Mexico, the Teopanzolco complex is more closely related to the Tenayuca complex of the central Basin of Mexico. Aztec II Black-on-Orange and Incised Guinda, both important components of the ceramics of Tenayuca (Noguera 1935), are relatively common at Teopanzolco, while Aztec I is absent and Graphite Guinda and Chalco-Cholula Polychrome are present but in very small numbers (Smith n.d.). The Teopanzolco-Tenayuca link is strengthened by the near identity of the major pyramids at the two sites (see Marquina 1935:Laminas 22 and 27); an analysis of architectural features suggests that the Teopanzolco pyramid is closest in form to Stage 4 at Tenayuca, dating to the end of the Early Aztec period (Smith n.d.). This brief consideration of the Teopanzolco complex suggests that it starts later than the Early Aztec A facet. However, Teopanzolco is linked to the Tetla and Tepozteco complexes through various trade items, and the Temazcalli complex marks the height of Early Aztec markers and Morelos-Puebla types at Xochicalco; these connections argue against too late a date for the joint origin of the Temazcalli and Teopanzolco phases. The 1200 date settled upon is therefore designed to represent a compromise which allows sufficient time for the

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phases on either side of this line. There is no necessary archaeological connection between the division of the Early Aztec period at 1200 and the start of the Morelos complexes at this time. It is assumed for the sake of simplicity that the Tenayuca complex starts around 1100 or 1150 and that its ceramics are not common in the southern Basin of Mexico until 1200. However, it may well be that the Tenayuca ceramics do not start until the Early Aztec A/B division. If so, and if this division is correctly dated at 1200, then it is very likely that those changes are linked in some manner to the start of the Teopanzolco phase in the Cuernavaca area. For the present, however, the archaeological record is equivocal on the relationship between the changes in Morelos and those in the Basin of Mexico around 1200.

Dating the Remainder of the Sequence

The division between the Temazcalli and Early Cuauhnáhuac phases was established by the presence of Late Aztec trade sherds at Xochicalco (Aztec III Black-on-Orange, Texcoco Molded/Filleted; see Chapter 5). Therefore the starting dates of the Late Aztec and Early Cuauhnáhuac periods are firmly linked and are here placed at 1350, following Sanders, Parsons and Santley (1979:466). The presence of Teopanzolco trade sherds in Early Cuauhnáhuac deposits (n = 15) indicates that in Cuernavaca, the Teopanzolco complex continues past 1350. However, the lack of Late Aztec markers in this phase (and their presence in overlying Late Postclassic or Cuauhnáhuac complex levels in Cuernavaca--Smith n.d.) indicates that it may not extend very far into the Late Postclassic period. Furthermore, the Teopanzolco sherds in the Early Cuauhnáhuac phase at Xochicalco occur

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in the three earliest levels of that phase and are absent in the two latest levels (see Appendix B). Based upon these considerations, a terminal date of 1400 for the Teopanzolco phase is reasonable (Table 75). The Early/Late Cuauhnáhuac division is dated at midway through the Late Postclassic period (1350-1520; the mid-date is 1435), rounded to the nearest decade. The postulated alignment of the Xochicalco and Cuernavaca sequences allows some overlap between the Early Cuauhnáhuac phase and the Cuauhnáhuac phase of Cuernavaca; this makes sense given the presence of Late Aztec markers in both complexes. Nevertheless, it could turn out that the ends of the Early Cuauhnáhuac and Teopanzolco phases coincide; if so, a later date (i.e. 1440) is more likely than an earlier date (i.e. 1400), based upon the start of the Early Cuauhnáhuac complex at Xochicalco at 1350.

Turning finally to the enigmatic Phase H, the 43 sherds recovered from unit 17 present a problem for chronological and comparative analyses. This deposit, stratigraphically situated between a Phase G level and a Temazcalli level, was initially thought to represent the Tilancingo phase. However, the vessel forms encountered do not greatly resemble those of the Tilancingo or later phases, and the outcurved bowls in particular are much closer to Phase G forms. Furthermore, the diagnostic decorative classes of the Tilancingo complex--Guinda, Toluca Red-on-White, and Wavy Line Red-on-Cream--are absent from unit 17. Nevertheless, in spite of the resemblance in bowl forms, the sherds of unit 17 do not fit in with the Phase G ceramics of Xochicalco. The comals and basin are more typical of later Postclassic ceramics, and there are no clear Phase G markers in the collection.

The decision to place the ceramics of unit 17 chronologically in between Phase G and the Tilancingo complex was based upon two factors in

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addition to the above considerations. First, the seriation placed unit 17 at the very start of the Postclassic sequence. As discussed in Chapter 5, the unit represents the single most deviant collection in the seriation because of both its small sample size and its basic lack of resemblance to the later deposits. Nevertheless, even with its deviant position in the scaling configuration, unit 17 falls at the start of the temporal sequence. Second, whereas the Tilancingo complex was originally thought to pertain entirely to the Early Postclassic period (see Smith 1981a and 1981b, where the Tilancingo complex was called Phase H), comparisons with other central Mexican ceramic chronologies discussed above led to its present position overlapping parts of both the Early and Middle Postclassic periods. This compression of the Postclassic sequence left a gap between Phase G and the Tilancingo complex, into which the sherds of unit 17 were placed as Phase H.

This chronological pleacement of Phase H is still not completely satisfactory. There is a great difference between the ceramics of Phase G, which developed out of Phase F (Cyphers n.d.), and the later Postclassic ceramics. Phase H falls into the gap between these two traditions, and it does not appear to represent a true transition. Until more examples of these ceramics are uncovered, or until the end of the Epiclassic tradition and the start of the Postclassic tradition are better understood (based upon further excavation), Phase H will remain a tentative chronological and cultural entity.

Summary and Comment on the Toluca Valley Chronology

The Xochicalco Postclassic chronology illustrated in Table 75 represents the most precise temporal picture possible on the basis of

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current archaeological data alone. The calendar dates proposed are tentative and subject to change because of the lack of chronometric dating in Postclassic central Mexico. Nevertheless, the Xochicalco sequence is strongly tied in with surrounding sequences in other parts of Morelos, the Basin of Mexico, and southwestern Puebla. Any major change in the dating of Postclassic phases in any one of these areas will probably require corresponding changes in related phases in other areas. These chronologies are therefore highly susceptible to modification, and there is considerable room for refinement in all of them.

Because of the abundance of Toluca Valley imports in Postclassic Morelos, both in the Xochicalco sequence and in the Teopanzolco ceramic complex, it was originally hoped that phased examples of these ceramics would help establish the Xochicalco and Cuernavaca chronologies. However, scrutiny of the published literature on ceramics of the Toluca Valley indicated that the Postclassic chronology there is at present hopelessly confused. In fact, it may turn out that the Morelos chronologies will help establish a Postclassic sequence for the Toluca area. Some words should therefore be said concerning the reasons I chose to ignore the Toluca Valley "chronologies" of García Payón (1941) and Vargas (1975).

García Payón (1941) presents a five-period sequence running from Middle Formative through Late Postclassic times (periods "0" through 4). He describes a number of decorative types in general terms and illustrates a series of complete vessels identified by type and period (1941:Laminas I,III,IV). However, the illustrations are published at such a small scale and reproduced so poorly that it is almost impossible to discern the patterns of decoration; similar illustrations at an even smaller scale

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are given in a later publication (García Payón 1956/57:Fotos 1-7). Aside from a few scattered references to relative type frequencies in different excavations, García Payón does not describe how his chronology was developed nor the nature of the evidence supporting it. Durbin, in a study of the Postclassic Toluca Valley, accepts García Payón's chronology without question, and elaborates it by assigning dates to the phases (Durbin 1976:11), based upon his interpretation of some suggestions made by García Payón (1941:passim).

In reporting the ceramics from Piña Chán's major excavations at Teotenango in the Toluca Valley, Vargas (1975) presents a five-phase chronology, but does not say how the sequence was derived nor the extent of support for it. Furthermore, he makes no reference to García Payón's chronology (other than a few scattered remarks on correspondences between the ceramic types defined at Teotenango and those defined by García Payón). An examination of other work of Vargas (1978) shows that his first two phases, covering the Late Classic and Epiclassic periods, are well defined and supported by considerable stratigraphic data (though at a nearby site and not at Teotenango itself). His final three phases are based upon several hundred red on buff and polychrome vessels recovered in a huge mass burial in the main plaza at Teotenango sometime after the main Epiclassic occupation of the site (see Tommasi 1980). It would appear that red on buff vessels are simply assigned to Phase 3, black and red on white to Phase 4 and black and white on red to Phase 5 (Vargas 1975:249-262). Tommasi, on the other hand, interprets all of the burials and hence all of the vessels as contemporaneous, dating perhaps to the Middle Postclassic period (personal communication, 1980). She describes the vessels as a

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single complex (Tommasi 1978) without reference to the sequences of García Payón or Vargas.

In summary, there is no data supporting the Postclassic portion of Vargas' (1975) Toluca Valley chronology, and there may or may not be data to support García Payón's (1941) sequence. Apparently neither Tommasi nor Vargas consider García Payón's chronology sufficiently reliable to use in their own work on Postclassic ceramics of the Toluca Valley. Wanda Tommasi and Leonardo Manrique are currently supervising the posthumous publication of some of García Payón's previously unpublished monographs on the archaeology of the Toluca Valley (Wanda Tommasi, personal communication, 1981), but the volume on ceramics has yet to appear. It is hoped that it will contain an elaboration of García Payón's original chronology and the stratigraphic or other evidence supporting it (or if not, perhaps it will at least present adequate illustrations of the decorated ceramics). However, until such information is made available, the Postclassic chronology of the Toluca Valley must be seen as still awaiting definition. Perhaps the Toluca Valley trade sherds from dated contexts at Xochicalco (Chapter 6), Teopanzolco (Smith n.d.), and Malinalco (Galvan 1974/75) will contribute to that definition.

Implications of the Archaeological Sequence

General Considerations

William Y. Adams recently published an article challenging what he calls "the argument from ceramics to history" (1979). He begins,

> I will suggest, on the basis of dated pottery types from Nubia and independently dated historical developments, that a close correlation between the two cannot safely be assumed. . . . In ancient and

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> medieval Nubia I have found that some of the most significant political and ideological changes were not reflected in contemporary pottery, while at other times there were radical stylistic changes in the pottery for which no very immediate external cause can be discovered (Adams 1979:727).

After making the point that a simple one-to-one correspondence between ceramic change and "political and ideological" change cannot be assumed, Adams goes on to suggest however that ceramics are poor indicators of cultural change and should therefore be used very sparingly in the reconstruction of prehistoric change (p. 734). While Adams' basic argument is correct (i.e. simple one-to-one correlations cannot be assumed), the extension of it is not warranted. In the study of prehistoric cultural change, an archaeologist would be quite naive to rely solely upon a ceramic chronology. Inferences are more productively sought in the data of subsistence, settlement patterns, intra-site artifact distributions, trade and exchange patterns, and the like. For processual studies, the spatial context of artifacts is at least as important as their temporal context. A ceramic chronology may form the baseline for such studies, but it is not reasonable to expect the chronology alone to adequately monitor cultural change.

Nevertheless, the questions may be raised of the extent to which a ceramic chronology can be used to infer prehistoric change, and the conditions under which ceramic changes are or are not correlated with larger cultural changes. In addressing these issues, a finer-grained analysis than that presented by Adams (1979) is necessary (what are the spatial contexts of the ceramic artifacts used by Adams?). Some of the more promising directions of research here suggested by the various commentators on Adams' article. Arnold, for example, agrees that while

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ceramics do not provide a precise analog of culture history, the "correspondence between specific vessel-forming techniques and language groups in Guatemala" does provide a means of studying cultural change through ceramic change (Arnold 1979:735; see also Arnold 1978). On a more general level, the cultural significance of vessel form classes, discussed in Chapter 6 above, suggests that major innovations in the basic form-set at a site will probably signal major cultural innovations. This relationship cannot be evaluated for Adams' Nubian sequence, given the scanty presentation of ceramic data. For vessel form, he presents only "principal forms" with descriptions such as "cups, bottles and jars" or "vases and footed bowls" (1979:Figure 2), and he draws just two "typical forms" for each phase (1979:Figure 3). It may well be that the Nubian political/ideological changes are indeed mirrored in vessel form changes, but this cannot be determined from the data provided by Adams (the same problem holds for his presentation of surface finish, painted decoration, and other dimensions of ceramic variability).

Another useful approach to the problem of using ceramic sequences to infer political and other changes is suggested by Myers, who makes a distinction between folk pottery and elite pottery within state-level societies (1979:738). Using examples from coastal Peru, Myers shows that folk pottery-mainly utilitarian plainware--is quite conservative through time, exhibiting little change that can be linked to political events. On the other hand, "imperial wares"--fancy painted ceramics--do reflect major political changes that took place on the north coast of Peru. Furthermore, during the Late Horizon, the production and distribution of elaborate Inca pottery was under state control and was used deliberately for political

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purposes (distribution to local elite, etc.), and thus its presence in a ceramic sequence has definite implications concerning political events (see also Thompson 1968:116,118).

In Postclassic Mesoamerica, "fancy" polychrome painted ceramics are quite widespread, and the associations between "imperial wares" and political changes noted by Myers for Peru are not nearly as strong (e.g. "Aztec" pottery did not function at all like Inca pottery in terms of political strategy--see below). Nevertheless, Mesoamerican Postclassic decorated ceramics were elite-oriented prestige goods (Brockington 1973: 84f; Smith and Heath-Smith 1980:31; Blanton et al. 1981:246-250), some of which were widely traded while others had a more localized distribution. Changes through time in the amount and types of fancy decorated pottery in a region should therefore be expected to reflect political or economic processes involving local elites (as Myers 1979:739 points out, decorated ceramics were evidently not used in a specific elite or state context within the Nubian cultures discussed by Adams 1979).

In sum, while a simple correlation of ceramic and historical change cannot be assumed a priori, there is ample reason to believe that many political, economic and other cultural changes will leave an imprint on the nature of the ceramics used in a given area. In the following section, changes between Postclassic phases at Xochicalco are discussed in terms of their possible cultural implications. These implications are then evaluated in terms of the ethnohistoric chronology, and it is shown that ceramic change does indeed measure certain kinds of cultural change.

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The Xochicalco Sequence

The Start of the Postclassic Sequence

The sharp discontinuity between the Phase G and the later Postclassic ceramics of Xochicalco has been mentioned several times in previous chapters. It was originally desired to include samples of Phase G ceramics in the attribute study and seriation; however, the differences between the two groups of ceramics are so great that their inclusion in a single classification scheme would require a tremendous proliferation of dimensions and attributes. The most obvious differences between Phase G and the Postclassic phases are in vessel form. All five of the basic Postclassic form classes are present in Phase G, but the constituent forms and their associations with other dimensions are quite distinct. Comals are very rare prior to the Postclassic complexes, and nearly all examples have a sharp break-angle. Basins are perhaps more common than in the later phases, but rim forms grade into olla forms, unlike Postclassic basins which have very distinct forms. Phase G bowl forms are very different from Postclassic forms; outcurving and recurved forms are the most common, Z-angles are not uncommon, and plain bowls often have tripod supports. Platos are present, but are not limited to decorated wares. Phase G sherds can usually be distinguished from Postclassic sherds on the basis of surface finish and paste. Slip colors are somewhat different and a wider range of pastes or tempers are found in the earlier material. Very little decorated ware is found in Phase G, and most decoration is limited to red rim bands, red circles, or other simple red on buff or red on orange designs; nothing like the elaborate Postclassic decorative classes is present prior to the Tilancingo phase. The observations are based upon

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(limited) personal study of Phase G ceramics from Xochicalco; more complete descriptions may be found in Cyphers (1980; n.d.).

The extensive differences between Phase G and Tilancingo ceramics contrast with the relative continuity of the entire Postclassic sequence described in Chapter 6. The reorientation in basic vessel forms and the complete break in decorative classes strongly suggest differences in ethnic and probably linguistic affiliation between the makers of Phase G and Tilancingo pottery. As discussed above, the "Phase H" ceramics from unit 17 do not closely resemble those on either side of the break. On the basis of this evidence, it appears that the El Puerto hilltop was abandoned after the fall of Xochicalco and not reoccupied for a century or two. The surface collections of the Xochicalco Mapping Project suggest that this abandonment of El Puerto was only one aspect of a general abandonment of the central sectors of the city closest to the ceremonial precinct at this time (Kenneth Hirth, personal communication; see also Noguera 1945:151; Litvak 1972:68). During the following century or two, some nonlocal group, perhaps with Mazapan affiliations, visited or perhaps lived briefly at El Puerto, depositing the sherds recovered in unit 17. Even after the fall of the Xochicalco state, the ceremonial zone probably remained an attraction based upon its prior religious and cultural importance. Then at some point around 1100 (or perhaps earlier), El Puerto was reoccupied by a population whose basic cultural and economic orientation was quite distinct from that of the former occupants of Xochicalco.

The Tilancingo/Temazcalli Transition

Although the basic continuity and integrity of the Postclassic tradition at Xochicalco has been emphasized, significant changes did take

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place at certain points. Of the three phase transitions identified between 1100 and 1520, that between the Tilancingo and Temazcalli ceramic complexes represents the greatest change. The most obvious modification is the addition of many new forms, decorative classes and other attributes (compare Tables 30 through 40 with 41 through 53); however, this increase in variability is due in part to the larger sample size of the latter complex. It is far less likely that the 504 quantified Tilancingo sherds contain an adequate sample of the variability of the ceramics from that phase than that the 2440 Temazcalli examples are an adequate sample of the variability in that phase. Nevertheless, not all of the additions manifest in the Temazcalli complex can be attributed to differences in sample size. In a number of respects, new ceramic patterns were established at this point that remained characteristic of the Xochicalco repertoire until 1520; some of the more significant of these new patterns are listed in Table 76.

Throughout the entire Postclassic sequence, hemispherical and conical bowls together comprise three-fourths or more of all bowl forms. However, the relative abundance of the two form subclasses is quite different in the Tilancingo complex compared to the later phases (Table 76). Only two local bowls in the former phase are of the conical shape (although several additional examples are present in imported wares), whereas this subclass increases in frequency to a fairly constant proportion in succeeding phases. Aside from the Tilancingo phase, the Temazcalli ceramics exhibit the greatest percentage of new forms (i.e. the percent of all forms which are not shared with the previous complex). This is due in part to the greater sample size and larger number of total forms (of all form classes) in this phase, but it probably also reflects significant form additions

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TABLE 76

SELECTED INDICATORS OF CULTURAL CHANGE BETWEEN PHASES

Indicator	Phases			
	Tilancingo	Temazcalli	Early Cuauhnáhuac	Late Cuauhnáhuac
Local bowl forms: ratio of hemispherical to conical	14.0	2.5	2.1	2.1
Total number of forms	19	53	42	26
% of forms which are new	(100.0)	73.6	21.4	46.2
Specialized forms:[a]				
miniature tripod bowl	-	x	x	x
pitcher	-	x	x	-
copa	-	-	x	-
Brown-black or mottled brown bowls (% of total bowls)	-	4.5	13.8	32.1
Imported ceramics (% of all decorated)	56.3	28.7	28.2	26.5
Tlahuica Polychrome sherds (% of all decorated)	-	17.7	33.3	24.5
Total quantified sherds	504	2440	2179	813

Note:

[a]Noted in presence (x) and absence (-).

independent of sample size. None of the three specialized serving vessels are present in the Tilancingo complex, and the brown-black or mottled brown finish is not found either. These data indicate that several features of Postclassic serving vessels that are not present in the Tilancingo complex become established in the succeeding phase and last for the rest of the sequence.

When decorated ceramics are considered, there is both continuity and discontinuity across this transition. Continuity is found in the prevalence of Toluca Valley and Guerrero trade sherds in both phases (Table 77), and in the small but consistent numbers of Basin of Mexico and eastern Morelos/southwestern Puebla trade pieces. Discontinuity is evidenced in the overall decline in the frequency of imported decorated ceramics relative to local classes, and in the inception of the Tlahuica Polychrome style in both local and imported (Teopanzolco complex) decorative classes. Again, these latter changes mark the start of patterns which then persist throughout the remainder of the sequence, while most of the imported classes present in both phases do not continue throughout the entire sequence (Tables 76 and 77).

In summary, the transition between the Tilancingo and the Temazcalli ceramic complexes is marked by the inception of a number of ceramic attributes and classes which come to characterize all succeeding phases. These "typical" western Morelos Postclassic traits include an emphasis on brown-black bowls, a constant ratio of hemispherical to conical bowls, a greater emphasis on local as opposed to imported decorative classes, and perhaps most important, the abundant presence of vessels painted in the new Tlahuica Polychrome style. The combination of changes in vessel form and changes in

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TABLE 77

SUMMARY OF DECORATIVE CLASSES BY CERAMIC COMPLEX

Class	Tilancingo		Temazcalli		Early Cuauhnáhuac		Late Cuauhnáhuac	
	N	%	N	%	N	%	N	%
Total Decorated	80	15.9	300	12.3	174	8.0	49	6.0
LOCAL CLASSES	22	27.5	165	55.0	99	56.9	22	44.9
Red-on-Buff Olla	2	2.5	6	2.0	2	1.1	-	-
B-3 Polychrome	-	-	-	-	2	1.1	-	-
B-4 Polychrome	-	-	16	5.3	36	20.7	10	20.4
Tlahuica Polychrome Olla	-	-	12	4.0	3	1.7	2	4.1
Related Polychrome	-	-	-	-	-	-	2	4.1
Eroded Tlahuica Bowl	-	-	5	1.7	2	1.1	-	-
Guinda	15	18.8	116	38.7	52	29.9	6	12.2
Red-on-Buff Bowl	5	6.3	10	3.3	2	1.1	2	4.1
IMPORTED CLASSES[a]	45	56.3	86	28.7	49	28.2	13	26.5
A. Toluca Red-on-White	18	22.5	26	8.7	-	-	(1)[b]	-
A. Toluca Black-on-Red	3	3.8	-	-	-	-	-	-
B. Wavy Line Red-on-Cream	16	20.0	15	5.0	-	-	-	-
B. Taxco Black-on-White	-	-	1	0.3	-	-	-	-
C. Malinalco Polychrome	-	-	-	-	5	2.9	-	-
D. Teopanzolco types	-	-	20	6.7	15	8.6	(1)	-

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TABLE 77 (continued)

	Class	Tilancingo		Temazcalli		Early Cuauhnāhuac		Late Cuauhnāhuac	
		N	%	N	%	N	%	N	%
E.	Morelos-Puebla Bl/Orange	1	1.3	7	2.3	–	–	(1)	–
	Graphite Guinda	3	3.8	8	2.7	2	1.1	–	–
	Chalco-Cholula Polychr.	–	–	1	0.3	2	1.1	–	–
F.	Aztec I Black-on-Orange	–	–	1	0.3	–	–	–	–
	Aztec III Black-on-Orange	–	–	0	0	12	6.9	–	–
	Texcoco Fabric Marked	4	5.0	5	1.7	6	3.4	1	2.0
	Texcoco Molded/Filleted	–	–	–	–	6	3.4	11	22.4
G.	Incised Redware	–	–	2	0.7	1	0.6	1	2.0
INDETERMINATE CLASSES[c]		13	16.3	49	16.3	26	14.9	14	28.6

Notes:

[a]Sources of imported ceramics: A, Toluca Valley; B, Taxco region of Guerrero; C, Malinalco; D, Cuernavaca region; E, Eastern Morelos/southwestern Puebla; F, Basin of Mexico; G, unknown.

[b]Figures in parentheses represent redeposited earlier sherds and are not figured in the totals.

[c]Indeterminate decorated classes include eroded and fragmentary sherds of indeterminate origin.

decorated ceramics suggests that the Tilancingo/Temazcalli transition involved something more than just local ceramic and cultural development yet something less than total population replacement.

The Temazcalli/Early Cuauhnáhuac Transition

This change of ceramic complexes involves the greatest continuity of the three Postclassic transitions at Xochicalco. As the figures in Table 76 indicate, there is a basic continuity in vessel form, the brown-black bowl finish mode increases in frequency, and the ratio of imported to local decorated ceramics remains constant (although the total percentage of decorated sherds decreases by one-third--see Table 77). Teopanzolco imports remain important, and there is a marked rise in the frequency of local Tlahuica Polychrome bowls; as a result, the combined classes of Tlahuica Polychrome pottery comprise one-third of all Early Cuauhnáhuac decorated ceramics. External trade contacts exhibit a major reorientation at this juncture, with the Toluca Valley and Guerrero imports stopping and Basin of Mexico imports increasing by 400%; the major component of this last category is the Aztec III Black-on-Orange type. Ties to the west do not die out completely, however, since a number of sherds of Malinalco Polychrome attest to trade with that area.

In sum, the major components of the Tilancingo/Early Cuauhnáhuac transition are: (1) a continuation of local plainware patterns; (2) an increase in Tlahuica Polychrome classes; and (3) a reorientation of external trade from a primarily western to a primarily northern direction. Such changes as are present appear to relate most closely to the elite realm.

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Possible Subdivision of the Early Cuauhnáhuac Phase

It is mentioned above that when Teopanzolco imports are plotted by level according to the seriated sequence of Early Cuauhnáhuac levels, they occur exclusively in the first three of the five units (see Appendix B). Although no effort has been made to subdivide the Xochicalco phases (for reasons of reliability and sample size discussed in Chapter 5), there does appear to be a reasonable chance that such a subdivision of the Early Cuauhnáhuac phase has validity. Teopanzolco imports are consistently common for their duration at Xochicalco, occurring in every level from unit 20 to unit 6 (Appendix B), and their abrupt end at that point may be significant chronologically (and culturally). With the exception of one sherd of Graphite Guinda, all eastern Morelos/southwestern Puebla imports in the Early Cuauhnáhuac phase occur prior to this break, and there is a jump in the number of Aztec III Black-on-Orange and Guinda sherds after the break. The possibility of finding further discontinuities in the plainware was not investigated, however. Until further excavations are carried out, it is not fruitful to speculate extensively on potential phase subdivisions at Xochicalco; nevertheless, this is currently the most likely subdivision anywhere in the sequence, and it has been indicated in Table 75.

The Early/Late Cuauhnáhuac Transition

This change is marked by a large reduction in sample size, but the percentage of new forms is relatively high (Table 76), perhaps suggesting some reorientation in the vessel forms utilized. Brown-black bowls reach their greatest frequency in the Late Cuauhnáhuac complex, and a cache of eleven such vessels was recovered from levels of this phase. Local Tlahuica

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Polychrome classes continue at the same level, and there is a significant decrease in the frequency of Guinda sherds (Table 77). With the exception of Basin of Mexico imports and Incised Redware, no foreign ceramics continue across this transition. Even allowing for the reduction in sample size, the change from the Early to the Late Cuauhnáhuac phase appears to be relatively great. Decorated ceramics comprise only 6% of the total sherds, and although Tlahuica Polychrome classes continue, the repertoire of painted pottery is quite impoverished compared to previous phases. External contacts are limited to the Basin of Mexico (the origin of Incised Redware is unknown), and the Guinda class has the lowest frequence of any Postclassic phase.

Because the Late Cuauhnáhuac deposits are only found in the refuse above the El Puerto plaza floor, whereas Early Cuauhnáhuac deposits form the top strata in most excavations outside of the plaza, it appears that the later material was deposited after the main ceremonial or public area of El Puerto had been abandoned. Given the break in the configuration of occupation between the phases, the more limited and perhaps specialized nature of the Late Cuauhnáhuac material might suggest that the two phases are not directly comparable. However, similar patterns of ceramic change characterize the Early to Late Cuauhnáhuac transition at Coatetelco, thus reinforcing the validity of the Early/Late Cuauhnáhuac chronological transition. Based upon the phasing of Coatetelco refuse levels by discriminant analysis in Chapter 5, Early and Late Cuauhnáhuac deposits may be isolated, and the salient patterns of the Xochicalco transition are present at Coatetelco as well. Local Tlahuica Polychrome classes continue, while Guinda drops off in frequency. Teopanzolco imports drop off after the

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transition, but Basin of Mexico ceramics do not (the changes are described in Smith n.d.).

The End of the Postclassic Sequence

There is very little evidence concerning the dating or the nature of the end of the Xochicalco Postclassic sequence. Given that at least some central Mexican Late Postclassic ceramic types continued for a considerable time unchanged into the Colonial period (see for example Charlton 1979), it is conceivable that the Late Cuauhnáhuac phase continues past the Spanish conquest. However, due to the presence of imported ceramics, it cannot be argued that this phase is entirely post-conquest; the long-distance trading institutions of Late Postclassic central Mexico did not long survive the conquest (Gibson 1964:358-361; Rees 1975), and Colonial ceramic continuities are found in local as opposed to widely traded classes. On the other hand, it is also possible that the Late Cuauhnáhuac phase ends prior to the arrival of Cortés. For the sake of simplicity it is assumed for now that the Late Postclassic ceramic complexes of Morelos end around the year 1520.

The Cuernavaca Sequence

Although the Postclassic ceramics of Cuernavaca are not described in the present work, some mention has been made of this material in terms of sherds from the Teopanzolco complex found in the Xochicalco deposits. Because of the communication and interaction between western Morelos and the Cuernavaca area in Postclassic times, and because much of the ethnohistorical data are concerned with Cuernavaca (Cuauhnáhuac), a few words on the ceramic sequence in that area are in order.

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In terms of basic form classes and surface finish, Postclassic ceramics of Cuernavaca are very similar to those described in the present work from Xochicalco; paste tends to be more uniformly orange in the Cuernavaca complexes, however. Decorated ceramics of the Teopanzolco complex may be divided into five categories: (1) Tlahuica Polychrome, of which there are at least 11 distinct classes, not including type B-4; (2) Guinda; (3) Basin of Mexico imports (Aztec II Black-on-Orange, Texcoco Fabric Marked, Incised Guinda); (4) Toluca Valley imports (most of which are distinct from the Toluca Red-on-White class found at Xochicalco); and (5) other minor imported classes, including Chalco-Cholula Polychrome, Fine Orange, Graphite Guinda, and some polychrome bowls probably pertaining to the Tetla ceramic complex. This complex is represented at Teopanzolco (Noguera and Piña Chán 1956:57; Smith n.d.) and Gualupita (Vaillant and Vaillant 1934) as well as in the lower levels of excavations in the Palacio de Cortés in downtown Cuernavaca (Smith n.d.); the first two sites are located within the present city of Cuernavaca, approximately 1.5 km from the Palacio de Cortés.

At some point in time (1400 is suggested above), the Teopanzolco complex is replaced by the Cuauhnáhuac complex. These Late Postclassic ceramics are very similar to those of the Early and Late Cuauhnáhuac complexes at Xochicalco, and hence the common name (although there may turn out to be differences requiring separate complex designations). The primary difference between the Cuernavaca and Xochicalco Late Postclassic ceramics is a greater frequency and variety of Basin of Mexico imports in the former. The Tlahuica Polychrome types of the Teopanzolco phase do not continue into the Cuauhnáhuac phase; they are replaced by a heavy emphasis on Polychrome class B-4. Cuauhnáhuac complex ceramics are found throughout the Cuernavaca

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area, and overlie Teopanzolco levels in the Palacio de Cortés excavations; they are not in evidence at Teopanzolco or Gualupita, however. It should be possible with more excavation to divide the Cuernavaca sequence into more than these two gross phases. One question of immediate concern is whether the replacement of Teopanzolco polychromes by the B-4 class coincides with the inception of the Late Aztec imports. At the present time, however, no change within either the Teopanzolco or Cuauhnáhuac complexes in Cuernavaca is discernable.

Implications of the Ethnohistorical Sequence

Xochicalco and Western Morelos

It is concluded in Chapter 2 that the Náhuatl speaking population known as the Tlahuica settled in the central and western portions of Morelos in the first quarter of the thirteenth century. The next mention of western Morelos in the ethnohistorical sources concerns the towns listed in the Memorial de los Pueblos (1940:119) as subject to Azcapotzalco, the capital of the Tepanec Empire (ca. 1370-1425). These towns are said to have been governed by Tepanec agents (rather than local tlatoque) who supervised the collection of tribute destined for Azcapotzalco; furthermore, the Tepanec ruler Tezozomoc is said to have controlled private land holdings in the towns. Xochicalco is located between Miacatlan and Cohuintepec, two of the towns listed, and was thus probably within this Tepanec area (see Figure 3). By 1438, when Itzcoatl and the Triple Alliance conquered Cuauhnáhuac, however, Miacatlan and most of western Morelos (excluding Coatlan) was part of the Cuauhnáhuac province as reconstructed in Figure 5). Some time between the height of the Tepanec Empire (which may be set at roughtly 1380-1410) and

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1438, therefore, western Morelos and Xochicalco were incorporated into the Cuauhnáhuac province, probably by conquest. The statement that Cuauhnáhuac conquered the Cohuixco area of Guerrero in 2 Acatl = 1423 may throw some light on the date of incorporation of western Morelos into the Cuauhnáhuac province; western Morelos falls on the route between Cuauhnáhuac and Cohuixco and was probably conquered prior to the Cohuixco campaign. The Tepanec Empire did not come to an "official" end until the death of Tezozomoc or the ensuing formation of the Triple Alliance (in 1426 and 1428 respectively), but Davies (1973a:54-60) shows that there were signs of weakness well before that date. The Tepanecs were preoccupied with various wars in the Basin of Mexico during the early part of the fifteenth century, and it was probably during this period that the Cuauhnáhuac polity took advantage of the situation to wrest western Morelos away from Tepanec control.

Most of western Morelos, as part of the Cuauhnáhuac province, would have become indirectly subject to the Triple Alliance after Itzcoatl (and/or Nezahualcoyotl) conquered Cuauhnáhuac in 1438. Coatlan, however, was evidently not part of this polity when Moctezuma Ilhuicamina reconquered Morelos in 1452, for it is listed as a separate conquest in the sources. Given the location of Xochicalco between Coatlan and Cuauhnáhuac, it can only be said that it became (indirectly) subject to the Triple Alliance in either 1438 or 1452, although the former is more likely given its inclusion in the Cuauhnáhuac province. After this point, western Morelos receives no further mention in the native historical sources. In 1519, Xochicalco was included in either the Miacatlan or the Cohuintepec city-state (Figure 6), both of which were part of the Cuauhnáhuac province (and the Triple Alliance province of the same name).

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Cuauhnáhuac

As in the case of western Morelos, the arrival of Náhuatl speakers in the Cuernavaca area is estimated from native historical sources to have occurred in the first few decades of the thirteenth century. Then from the first dated reference to Cuauhnáhuac (1319, at the expulsion of the Mexica from Chapultepec) until Itzcoatl's conquest of the city in 1438, there are increasing references in the Basin of Mexico histories to the Morelos polity, both explicitly and implicitly documenting close ties between the two areas. Accounts dealing with the relationship between Cuauhnáhuac and the Tepanec Empire are contradictory (e.g. Mexica sources state that Acamapichtli—and by implication the Tepanecs as well—conquered Cuauhnáhuac around 1380, while other sources speak of the Cuauhnáhuac tlatoani as one of the four most powerful rulers in central Mexico, second only to Tezozomoc). Nevertheless, whatever the actual relationship, a general picture emerges of Cuauhnáhuac as a strong, independent and expanding polity. The best evidence for close ties between Cuauhnáhuac and the cultures of the Basin of Mexico at this time is the political alliance marriage in ca. 1396 between the Mexica tlatoani Huitzilihuitl and the Cuauhnáhuac princess Miahuaxihuitl, and the cotton trade which was established then or soon after.

Cuauhnáhuac was conquered by the Triple Alliance in 1438, at which time tribute payments to the Basin of Mexico (destined for Tenochtitlan and/or Texcoco) are explicitly said to begin. Moctezuma Ilhuicamina conquered Cuauhnáhuac again in 1452, presumably after a rebellion. In spite of these conquests, the Cuauhnáhuac province was expanding territorially at the time, and by 1519 covered all of western Morelos (see Figures 3, 5, and 6). At the same time, interaction with the Basin of Mexico continued at an even

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more intensive level after 1452, with Cuauhnāhuac and the other Morelos provinces exhibiting closer ties to the Mexica state and society than any other area outside of the Basin of Mexico. Finally, there are several references to the elaborate dedication ceremonies of a new temple in Cuauhnāhuac in 1490 or 1491.

Correlation of the Archaeological and Ethnohistorical Chronologies

Arrival of the Tlahuica: Ethnicity in Postclassic Morelos

The historically and linguistically documented arrival in Morelos of a Nāhuatl speaking population known as the Tlahuica can be correlated with the start of the Temazcalli and Teopanzolco ceramic complexes. This association is supported by several lines of evidence. First, the historical and archaeological dates fall within a decade or two of each other (see Table 78). While there is considerable room for error in both the historical and ceramic chronologies, the close correspondence between the independently-derived dates is striking. Perhaps more important than the specific dating of this process is the correspondence between the Tlahuica arrival, which represents the advent of the cultural and linguistic group that was to occupy the area of Morelos through the time of the Spanish conquest, and the cluster of ceramic traits in both plain and decorated wares that was initiated in the Tilancingo complex, subsequently continuing through the end of the Postclassic sequence. The most important of these ceramic traits, the Tlahuica Polychrome style, provides particularly strong support for the historical/archaeological correlation under consideration.

The name "Tlahuica" was first applied to the Postclassic polychrome pottery of Teopanzolco by Noguera in the early 1930's (see Vaillant and

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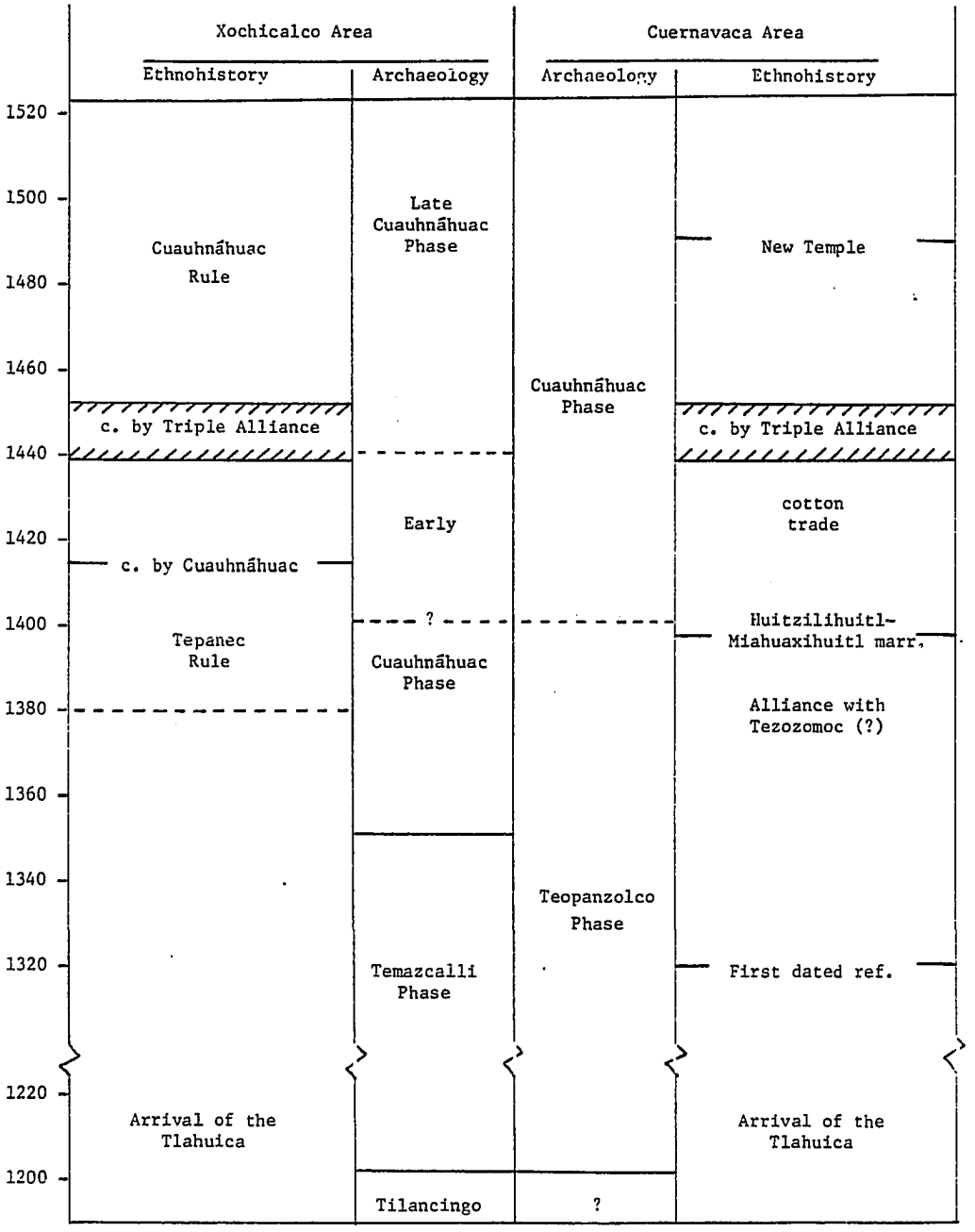
TABLE 78

CORRELATION OF ARCHAEOLOGICAL AND ETHNOHISTORICAL CHRONOLOGIES



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Vaillant 1934:93). While such ethnic designations for pottery classes often turn out to be incorrect (e.g. Aztec I Black-on-Orange pottery could not have been used by the historical "Aztecs" or Mexica), and may therefore be objected to in principle, the Tlahuica label has turned out to be an appropriate name for the polychrome ceramics under consideration here. The formal definition of the Tlahuica Polychrome style presented in Chapter 6 (it is the first such formal definition I am aware of) provides a link among the various polychrome types that have been labelled "Tlahuica" in the past 50 years, and all available evidence indicates that the component Tlahuica Polychrome types were indeed made and used by people known historically as the Tlahuica (indigenous uses of the term "Tlahuica" in the historical sources are discussed in note 6 to Chapter 3). It is proposed here that the Tlahuica Polychrome style is an empirically accurate and culturally significant "marker" of the Tlahuica enthnic group of Postclassic Morelos.

Although no direct evidence has survived indicating that the Postclassic people of Morelos classified themselves as an ethnically distinct unit, several lines of information justify their consideration as an ethnic group. First, the Tlahuica are mentioned in Chapter 29 of Book 10 of Sahagún (1950-69, bk. 10:165-197), which "telleth of the various kinds of people, the people who dwelt everywhere here in the land" (p. 165). Sahagún gives brief ethnographic sketches of fourteen different named groups who inhabited various parts of Mexico outside of the Basin of Mexico (pp. 176-188). In addition to information on subsistence and lifestyles, comments are included on whether the groups are civilized or savage and the language spoken by each. Moreover, most of these descriptions include a section on the "defects" ("In jmjtlacauhca") of the various groups. For

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example, the Otomi are "untrained, stupid" (p. 178), the Mazahua "are not well reared" (p. 183), and of the Tlahuica, "their defects: they appeared pompous as they tied on capes, as they went carrying flowers. And they were untrained; they were very cowardly" (p. 186). In short, these descriptions appear to represent typical ethnic stereotypes, revealing something of the way the Mexica viewed surrounding peoples who did not live in the Basin of Mexico.

In addition to this evidence that the Tlahuica were categorized as an ethnic group by other peoples, their very presence in the migration accounts argues further for that status. One of the most important notions in the definition of an ethnic group (in both the subjective and the objective sense) is the idea that ethnicity derives from real or imputed shared descent (Keyes 1976; Despres 1975:194). On one level, all of the Nâhuatl speaking groups that migrated from Aztlan share a common origin which, in addition to language, may have been a factor in general central Mexican solidarity. On a lower level, however, almost all of the individual migrating groups can be identified as distinct named ethnic groups at the time of the Spanish conquest (these are usually referred to, somewhat inappropriately, as "tribes"; see Gibson 1964:9-31; Nicholson 1978:293-317). The Mexica migration account served as a mechanism of ethnic solidarity within that group (Davies 1980:85f), and it is reasonable to assume that the same held true for the other central Mexican Nâhuatl groups listed as part of the same migration series. For example, the Historia Tolteca-Chichimeca (1947), a native historical account from the Puebla/Tlaxcala region, includes an account of migrations from Chicomoztoc, but rather than the usual list of central Mexican Nâhuatl groups ending with the Mexica, this account includes

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only local ethnic groups from Puebla and Tlaxcala (1947:86). Here, as in the Basin of Mexico migration accounts, an ethnic origin in the north is important and presumably formed part of the group's mechanisms of validation and solidarity. The lack of native historical accounts from Morelos precludes such analysis, but it is very likely that the inclusion of the Tlahuica in the Aztlan migration histories was a source of ethnic identity.

Given that the category of Tlahuica is valid as an ethnic group, the link between the Tlahuica and the Tlahuica Polychrome style is inferential. There are not surviving documentary accounts explicitly describing the kind of pottery used in Late Postclassic Morelos, but then aside from the statement that Moctezuma's meals were served in Cholula Polychrome vessels (Díaz del Castillo 1955:272), no such descriptions are found anywhere in central Mexico (cf. Chadwick and MacNeish 1969 for a comparative case from the Mixteca). Nevertheless, Tlahuica Polychrome bowls of type B-4 are found in abundant quantities at Late Postclassic sites throughout central and western Morelos, the area of definite Tlahuica affiliation (Smith n.d.). Eastern Morelos presents problems in terms of both ethnic affiliation--evidently both Tlahuica and Xochimilca groups settled there (see Chapter 2)--and archaeological documentation--Late Postclassic ceramic complexes have not been defined anywhere in Morelos west of Cuernavaca.

As far as present evidence allows, the spatial distribution of the Tlahuica ethnic group and the Tlahuica polychrome style of the Late Postclassic period are identical. This finding strongly suggests that the decorated ceramics served as a culturally significant expression of Tlahuica ethnicity. While some authors argue that there is no necessary relationship between ethnic groups and material culture or stylistic elements (e.g.

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Barth 1969:14-16), the question is empirical; in some cases ethnicity is clearly expressed in terms of discrete styles, while in others it is not (Hodder 1977; 1978:3-16; Wobst 1978; Keyes 1976). Some ethnographic examples of decorated ceramics serving as a vehicle for expressing ethnicity are the Canelos Quichua of Ecuador (Whitten 1981) and the Shipibo-Conibo of eastern Peru (DeBoer and Lathrap 1979). In addition to the Tlahuica case, the Malinalco Polychrome style probably functioned in a similar manner; the Nāhuatl-speaking Malinalca are included in the Aztlan migration accounts, and the distinctive decorative style began about the same time as the Tlahuica polychrome style (see Chapter 6 and Galvan 1974/75). On the other hand, the Late Postclassic Basin of Mexico contained at least nine distinct ethnic groups (Gibson 1964:9-31) which did not express their ethnicity through ceramics or other identifiable material items (see Sanders, Parsons and Santley 1979:471-474). The reasons for the presence or absence of specific stylistic markers of ethnic groups are complex, and probably center around economic and political variables affecting resource competition (see Depres 1975). Without going into this problem, Postclassic Morelos may be put forward as an area where decorated ceramics probably did serve a function in the definition and integration of the Tlahuica ethnic group.

Given the Late Postclassic association between the Tlahuica people and the Polychrome pottery, it is simple to project the relationship back in time to the early thirteenth century when both elements first appear in Morelos. The significance of differences between the decorative wares of the Temazcalli and Teopanzolco ceramic complexes is not known; the Tlahuica polychrome types in the two areas are clearly related, however, and the

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divergence between them probably relates to contrasting local ecological and social adaptations. To recapitulate, the correlation between the historically documented arrival of the Tlahuica in Morelos and the archaeologically documented style of the Temazcalli and Teopanzolco ceramic complexes is based upon three lines of evidence: (1) the independently derived dates for these events coincide; (2) the nature of ceramic change and Xochicalco between the Tilancingo and Temazcalli phases is consistent with the establishment of a new population; and (3) the Tlahuica polychrome pottery style, which served as an ethnic marker in the Late Postclassic period, originates in both Cuernavaca and Western Morelos at this time.

Cuauhnáhuac and Western Morelos, 1350-1438

The archaeological record indicates that during the period ca. 1200-1400, trade sherds from the Cuauhnáhuac area (Teopanzolco complex) are common in western Morelos, but western Morelos markers (e.g. B-4 polychromes) are absent from Cuauhnáhuac. At about 1400, the Teopanzolco complex comes to an end and its characteristic polychromes die out to be replaced by an emphasis on the B-4 type; after this time, both decorated and plain ceramics are quite uniform over all of the area under study. These ceramic changes suggest that prior to 1400, Xochicalco and Cuauhnáhuac were part of separate market networks, although limited exchange did take place; after 1400, the uniformity of material culture throughout Western Morelos and the Cuauhnáhuac area point to a single market network covering the whole area. The association of regional ceramic uniformity with marketing areas in Postclassic Mesoamerica, remarked upon in Chapter 6, is demonstrated in the Basin of Mexico, where the growing market system was accompanied by increasing homogenization of the ceramics (Smith 1982; see also Blanton et al. 1981:30).

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The abrupt end of Teopanzolco trade sherds at Xochicalco, dated archaeologically to ca. 1400, probably correlates with the conquest of Western Morelos by Cuauhnáhuac, which must have occurred sometime between ca. 1400 and 1423 (see Table 78). In line with the reasoning discussed in Chapter 1, the goal of conquest and territorial expansion in Postclassic Central Mexico was to establish tributary relationships. By taking Western Morelos away from the Tepanecs, thereby gaining its tribute, Cuauhnáhuac could tap resources which had previously gone to Azcapotzalco and simultaneously cut down on its exports to Western Morelos (which included pottery). The statement in Tezozomoc (1975a:90) that at the time of Huitzilihuitl's marriage to Miahuixihuitl (ca. 1396 or 1397), the Cuauhnáhuac tlatoani controlled a large territory and received great quantities of cotton and fruit in tribute fits in here; whether or not Western Morelos had been conquered in 1396, Cuauhnáhuac was clearly an expanding polity at that time with tributary relationships covering a large area.

Whereas Cuauhnáhuac had been in contact with the Basin of Mexico for several centuries prior to 1400 (based on historical references and Early Aztec ceramics in the Teopanzolco complex), the Huitzilihuitl-Miahuixihuitl marriage marks the first explicit reference in textual sources to trade between Morelos and the Basin of Mexico. As discussed in Chapter 3, the long-distance exchange involving cotton that started ca. 1400 is probably the same trade mentioned when Mexica merchants were attached in 1429. Since the transition from the Teopanzolco to the Cuauhnáhuac phase marks the inception of Late Aztec trade wares in Cuernavaca, the archaeological date 1400 for this transition makes sense in terms of historical evidence. The earlier appearance of Aztec III and other Late Aztec ceramics

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in Western Morelos (where they start ca. 1350) might be explained by the growing size and strength of Cuauhnáhuac, which may have tried to maintain political and economic independence from the polities of the Basin of México prior to 1400. One problem concerning the Teopanzolco/Cuauhnáhuac transition remains open: why should there have been such a major reorientation in Tlahuica polychrome types (abandonment of the Teopanzolco types and adoption of the Western Morelos B-4 type) at a time when Cuauhnáhuac was reaching its greatest political power and economic influence? This question will probably not be answered until a finer chronology is developed for the Cuernavaca area.

Conquest of Morelos by the Triple Alliance

The transition between the Early and Late Cuauhnáhuac phases at Xochicalco, estimated to occur at ca. 1440, coincides with the conquest of Morelos by the Triple Alliance (1438 and again in 1452; see Table 78). Caution should be exercised in the interpretation of this correspondence, however. First, the archaeological date of 1440 was derived arbitrarily by splitting the Late Postclassic period in half; and second, if my interpretation that El Puerto was abandoned and then resettled is correct, then a hiatus of uncertain duration exists somewhere in this time range. If the temporary abandonment of El Puerto is associated with Triple Alliance conquest, then it is more likely to be the result of Moctezuma's campaign of 1452 than Itzcoatl's conquest of 1438. Itzcoatl's campaign does not seem to have reached beyond Cuauhnáhuac itself, while Moctezuma is credited with taking Coatlan in Western Morelos (see Chapter 3), and thus probably conquered, destroyed, or otherwise disrupted additional settlements in the area.

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The alternative possibility, that the phase change took place in this time period but was unrelated to Triple Alliance conquests, cannot be ruled out entirely, however.

Even with these uncertainties in relating the archaeological changes to the historical record of conquest, the Early and Late Cuauhnáhuac ceramic complexes in all likelihood correspond to the periods before and after Morelos was incorporated into the Triple Alliance. If this is the case, what effects of that incorporation are visible in the ceramic record at Xochicalco? Given the decentralized nature of the Triple Alliance empire (see Davies 1973a:110ff), one should not expect to find direct Basin of Mexico interference or influence in rural, peripheral areas like Xochicalco. However, the tribute assessed by the Triple Alliance had the effect of intensifying production in local areas through the agency of provincial and city-state capitals (Berdan 1975:252ff; Broda 1978) and thus indirect effects are expected in areas such as Xochicalco. Unfortunately, the available data are not very informative concerning the intensification of production; if the Late Cuauhnáhuac sample size were larger, then at least such matters as the frequencies of spindle whorls would be investigated. On the other hand, there are some aspects of the observed ceramic record which may be related to the effects of the Triple Alliance conquest of Morelos.

The relative "impoverishment" of the Late Cuauhnáhuac ceramic inventory relative to all earlier phases may reflect the effects of Triple Alliance domination. This situation was noted above by the low overall frequency of decorated ceramics resulting primarily from large reduction in the Guinda class and the cessation of all foreign imports but those from

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the Basin of Mexico (see Table 77). The decline in the number of sources of imported ceramics does not imply any direct Triple Alliance interference in Central Mexican long-distance exchange networks; Tlahuica merchants were trading as far away as Tehuantepec during the time of the Mexica tlatoani Ahuitzotl (1486-1502; see Durán 1967 II:357). However, Triple Alliance tribute requirements included tropical goods not available locally (Códice Mendoza 1980:23r-23v; see Berdan 1975:115ff; Broda 1978) and this long distance trade to Tehuantepec may have served to obtain the quetzal feathers and other nonlocal goods required for tribute payment. In this sense, Triple Alliance conquest may have indirectly caused a reorientation in trade networks away from adjacent highland areas and toward tropical areas like Tehuantepec. This may account for the reduction in the number of sources of imported ceramics, while the reduction in decorated wares generally is probably a reflection of either (1) an increased tribute burden which reduced the local resources available for investment in costly items like decorated ceramics, or (2) a change in local elite structure. The latter possibility could involve a lack of elite families in the final Late Cuauhnáhuac occupation of El Puerto, which may or may not have been related to the effects of Triple Alliance domination of Morelos.

One important aspect of the Early to Late Cuauhnáhuac change at Xochicalco is the continuity of Basin of Mexico imports across the transition. As illustrated in Table 77, the frequency of Late Aztec trade sherds increases from 13.7 percent to 24.4 percent, while the number of imported types drops from three to two (Aztec III Black-on-Orange does not continue). Although the small sample size of decorated sherds in the Late Cuauhnáhuac complex limits the reliability that can be placed in these figures, it can

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nevertheless be said with confidence that Basin of Mexico ceramics are abundant both prior to and after the conquest of Morelos by the Triple Alliance. This finding appears to be valid for the Cuernavaca area as well, but interpretation is limited by the crude chronology available. The Cuauhnáhuac phase deposits which have been studied intensively and quantified come from the top prehispanic levels in the Palacio de Cortés excavations in downtown Cuernavaca. Cortés built his "palace" in 1531 (Riley 1973:40) on the site of the former tlatoani's residence (pp. 124-125, note 29), so these deposits probably date to the end of the Cuauhnáhuac phase. At this time, the only trade wares present are from the Basin of Mexico (Aztec III Black-on-Orange; "Xochimilco" polychrome; Texcoco Fabric-Marked; see Smith n.d.). Although there are no archaeological deposits from Cuernavaca that can be specifically dated to the Cuauhnáhuac phase prior to Triple Alliance conquest (ca. 1400-1438), the documentary sources speak of a regular cotton trade with Tenochtitlan. Therefore, the Triple Alliance conquest of Morelos was accompanied in both rural and urban settings by a continuity in trade relations with the Basin of Mexico.

In conclusion, it can be stated that in line with the hypothesis presented in Chapter 1, the presence of Late Aztec ceramics in Morelos cannot be used to indicate conquest by the Triple Alliance or integration into the Triple Alliance economy. These ceramics, of which Aztec III Black-on-Orange is the most common and readily identifiable class, are found both prior to and after the conquest of Morelos by the Triple Alliance. In the case of Xochicalco, Aztec III Black-on-Orange is associated with either Tepanec control or Cuauhnáhuac control, both of which occurred prior to 1438. This finding suggests that the date of occupation of Coatlan in

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Western Morelos may have to be reevaluated. On the basis of Late Aztec trade sherds (Aztec III Black-on-Orange; Late Aztec Guinda), Mason dates the site to post-1440 (1980:11-13,87) and interprets the remains in terms of the Triple Alliance economy (pp. 168-186). However, the ceramics of Coatlan indicate a dating anywhere in the 1350-1520 time span. Given Coatlan's apparent strong and independent character prior to 1452 as revealed in the documentary sources (see Chapter 3), the major period of occupation may well date prior to the conquest of Morelos by the Triple Alliance.

These findings from Morelos can probably be extended to other areas of Mexico as well. The political expansion of the Triple Alliance empire was a complex process whose territorial extent cannot be monitored by the simple presence of Late Aztec ceramics in provincial areas. These ceramics are more indicative of trade relationships than tributary relationships, and such trade occurred between Tenochtitlan and provincial areas both before and after they were incorporated into the empire. The hypothesis stated in Smith (1982) that a decrease in Basin of Mexico trade goods is to be expected after a provincial area is conquered by the Triple Alliance has not been confirmed. However, in the case of the conquest of Western Morelos by the Cuauhnáhuac polity in the early fifteenth century, the hypothesis is supported by the abrupt termination of Cuauhnáhuac imports (of the Teopanzolco complex) at the reconstructed time of the conquest.

Conclusions

The analysis presented in this thesis demonstrates that when appropriate methods are employed, both native historical and archaeological

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chronologies from Postclassic central Mexico can be refined considerably, and that the two temporal records can be accurately correlated. The historically reliable time span covered by the central Mexican native histories, usually said to begin near the inception of the fourteenth century, has been pushed back almost a century through the study of the Aztlan migrations, presented in Chapter 2. My demonstration that these thirteenth century dates are not entirely mythological in character, but rather pertain to verifiable historical events, rests upon an extensive comparative analysis of the relevant texts. It is only through such cross-checking of a large number of sources that reliable reconstructions of Postclassic political and social change can be inferred.

The ceramic chronology derived and described in Chapters 4 through 6 stands as the most refined Postclassic sequence for any region of central Mexico to date. The success of the chronological refinement in western Morelos results not from any special quality of the Morelos data but rather from the methods employed. First, non-typological ceramic analysis is a more flexible and informative approach than the typological orientation traditionally followed in Mesoamerican ceramic studies. Second, the use of quantitative seriation (in the form of metric multidimensional scaling) on the nontypological ceramic data permitted refinement of the preliminary chronology established from stratigraphy and cross-ties alone. The Morelos case described in the present work shows that archaeologists need not be satisfied with the 200- to 400-year phases currently employed elsewhere in central Mexico for the Postclassic epoch. Indeed, it is shown in Chapters 1 and 7 that until comparable chronological refinements are effected in other areas (most importantly in the Basin of Mexico), the processual questions of

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greatest interest simply cannot be addressed, much less answered satisfactorily.

The historical-archaeological correlations presented in Chapter 7 are most significant in two areas. First, it is shown that the historically documented arrival of the Nāhuatl-speaking Tlahuica ethnic group is signalled by the inception of the Tlahuica polychrome style in Morelos as manifest in the Temazcalli and Teopanzolco ceramic complexes. Second, the Triple Alliance conquest of western Morelos in 1438, described in the historical sources, coincides within a decade or so of the transition between the Early and Late Cuauhnāhuac phases at Xochicalco. This correlation allows for the first time an evaluation of the archaeological impact of Triple Alliance conquest in a provincial area.

The present work may be seen as an exercise in chronology-building whose full import will not be realized until a number of independent research endeavors currently underway are completed. Nevertheless, I have shown that basic chronological analysis using appropriate methods can yield considerable insight into the nature of prehistoric change. This work therefore represents a counter to arguments that ceramic change does not reflect historical change (e.g. Adams 1979), or that archaeology and native history cannot be correlated in central Mexico (e.g. Charlton 1981:155). Past failures in these areas derive more from inadequacies of conceptualization and methodology than from inadequacies of the archaeological or historical records.

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APPENDIX A

FORM CHART

The vessel form classification used in this work is illustrated in Figures 47, 48 and 49. The forms shown represent only those that are found in the Xochicalco excavated material. As such, they constitute a subset of the overall set of forms defined for the Postclassic ceramics of Morelos. The gaps in form numbers and in the illustrated form chart indicate Postclassic Morelos forms not encountered at Xochicalco (the complete Morelos form chart may be found in Smith 1981b; n.d.).

The numbering of olla, basin, bowl, and comal forms conforms to the following conventions:

00	Unknown form (form class known)
01	Unusual or odd form
04-07	Fragmentary rims (orientation known)

Fragmentary rims that could not be oriented are coded "00," while those that can be oriented are coded 04 through 07. The orientations of the fragmentary forms are shown only for the olla form class (Figure 47). For basins (200 series) and bowls (300 series), Forms 204 and 304 represent vertical walls, with successive numbers indicating increasingly outleaned walls. In the comal form class, Form 404 represents a horizontal or nearly horizonal orientation (angle of elevation less than 11°; see for example Form 410), 405 is slightly raised (angle between 11° and 22°; see for example Forms 436 and 437), while 406 has a larger elevation angle (between 22° and

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33°; see for example Form 443).

Plato forms are numbered between 360 and 370. Form 520 designates miniature bowls while Forms 601 and 603 indicate pitchers and copas respectively.

A list of all vessel forms represented at Postclassic Xochicalco is given in Table 79, which also classifies the forms by form subclass and indicates the frequency of the forms per phase.

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Figure 47. Form chart, ollas and basins.

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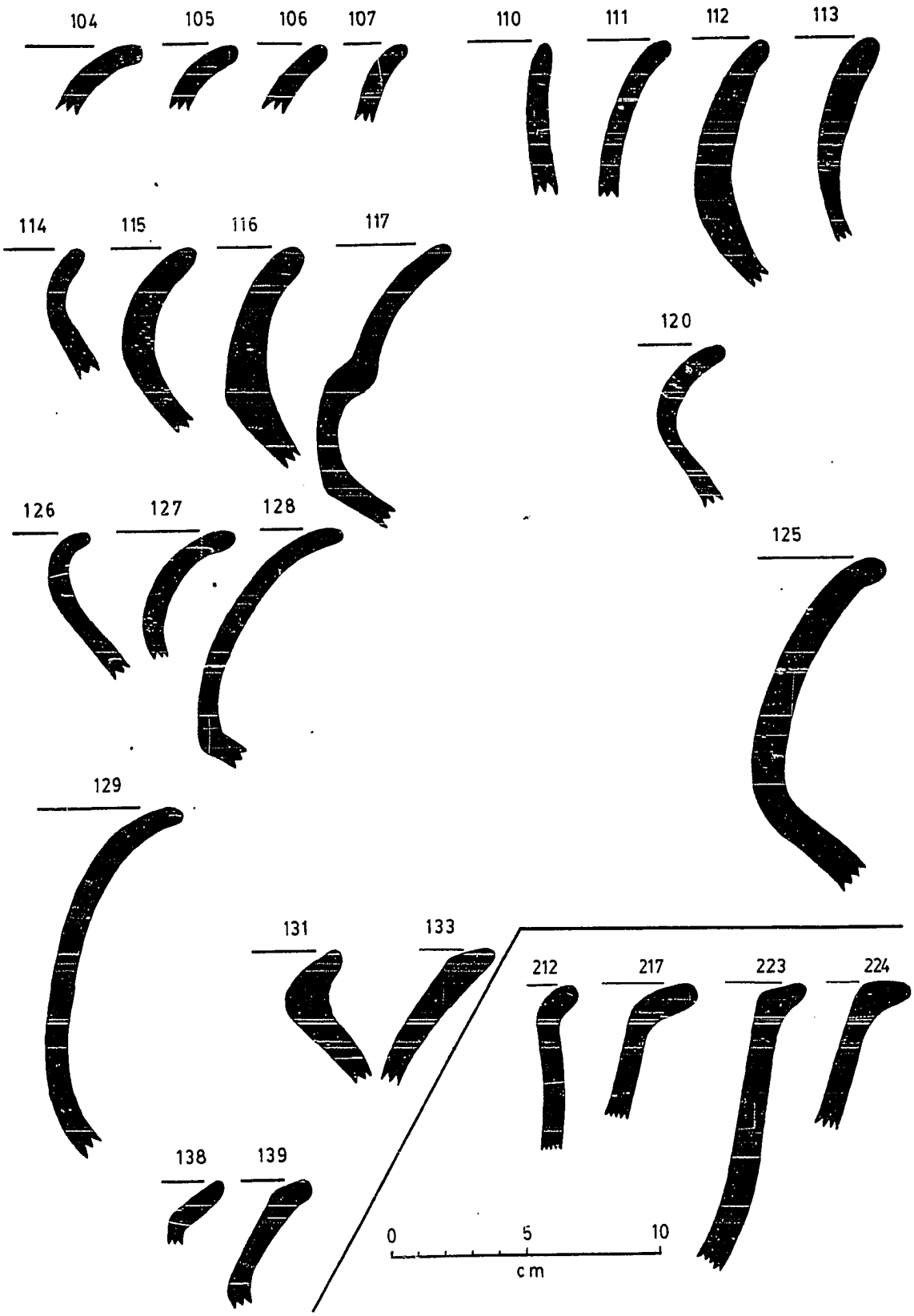

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Figure 48. Form chart, bowls.

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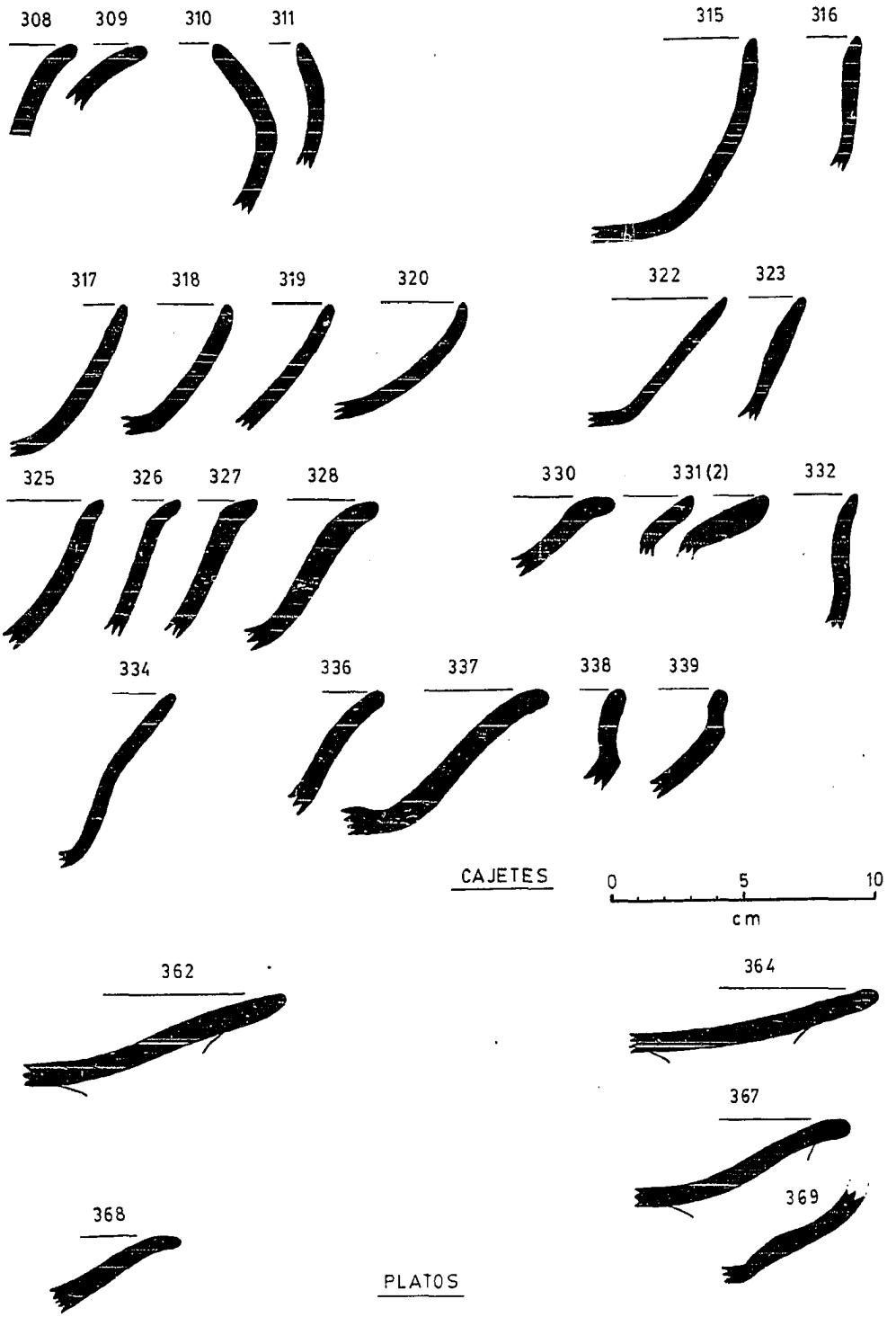

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Figure 49. Form chart, comals.

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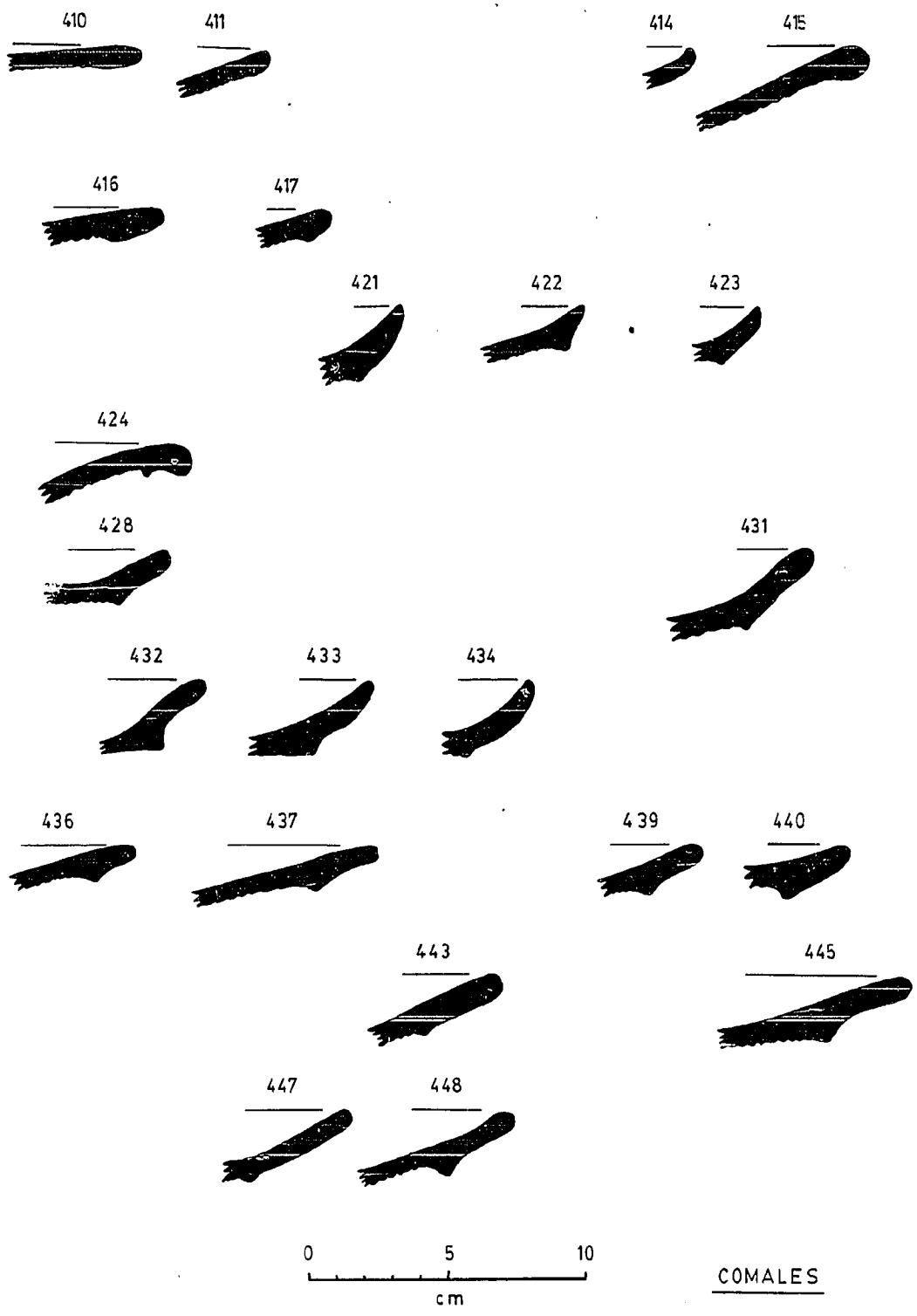

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TABLE 79. FORMS AND FORM SUBCLASSES PER PHASE

		Form Subclass					Number per Phase			
Form-Class	Form	Rim Curvature	Neck Height	Form Subclass	Form Subclass	Rim Elevation Angle	Phase H	Tilancingo	Temazcalli	Early Cuauhnáhuac	Late Cuauhnáhuac
O11a	100	-	-				-	2	-	-	-
	101	-	-				-	-	-	2	-
	104	5	-				-	1	5	4	5
	105	4	-				-	9	25	15	6
	106	3	-				-	11	22	10	7
	107	2	-				-	2	5	-	-
	110	1	3				-	1	-	-	-
	111	2	3				1	-	2	-	2
	112	2	3				-	-	-	1	-
	113	2	3				-	-	1	-	-
	114	3	1				1	-	-	-	-
	115	3	2				-	-	1	-	-
	116	3	2				-	-	-	-	1
	117	3	3				-	-	3	-	-
	120	4	1				-	-	-	3	-
	125	4	3				-	-	-	-	1
	126	-	-				1	-	-	-	-
	127	5	2				-	-	2	1	1
	128	5	3				-	-	1	-	-
	129	5	3				-	-	1	-	1
	131	-	1				-	-	1	1	-
	133	-	-				-	2	2	1	1
	138	-	-				-	-	-	-	1
	139	-	2				-	-	1	1	-

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TABLE 79 (continued)

Form-Class	Form	Form Subclass: Rim Curvature	Form Subclass: Neck Height	Form Subclass: Form Subclass	Form Subclass: Form Subclass	Form Subclass: Rim Elevation Angle	Number per Phase: Phase H	Tilancingo	Temazcalli	Early Cuauhnáhuac	Late Cuauhnáhuac
Basin	201						-	-	1	-	-
	204						-	-	-	1	-
	205						-	-	-	-	2
	206						-	-	1	2	-
	212						-	-	1	1	-
	217						-	1	-	1	-
	223						1	-	-	-	-
	224						-	-	1	-	-
Bowl	300			-			-	1	6	8	2
	301			-			1	-	6	5	1
	304			-			-	1	1	-	-
	305			-			-	2	2	5	3
	306			-			-	4	4	3	1
	307			-			-	-	-	1	-
	308			1			2	-	1	-	-
	309			1			-	-	4	-	-
	310			2			-	1	3	-	-
	311			2			-	-	3	1	-
	315			3			1	27	114	103	39
	316			3			-	3	8	3	-
	317			4			-	-	10	2	1
	318			4			-	-	1	9	6
	319			4			-	8	32	33	11
	320			4			-	-	3	5	1

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TABLE 79 (continued)

Form-Class	Form	Form Subclass: Rim Curvature	Form Subclass: Neck Height	Form Subclass: Form Subclass	Form Subclass: Form Subclass	Form Subclass: Rim Elevation Angle	Phase H	Number per Phase: Tilancingo	Number per Phase: Temazcalli	Number per Phase: Early Cuauhnáhuac	Number per Phase: Late Cuauhnáhuac
(Bowl)	322			5			-	1	5	2	1
	323			5			-	-	1	3	1
	325			6			-	1	2	-	-
	326			6			-	2	1	-	1
	327			6			-	5	10	1	1
	328			6			-	1	-	-	-
	330			6			-	-	1	-	-
	331			6			-	-	1	3	1
	332			7			-	1	2	3	-
	334			7			-	-	-	4	3
	336			7			-	1	-	-	3
	337			7			-	-	1	-	-
	338			7			-	-	-	-	1
	339			7			-	-	3	3	1
Plato	361						-	-	-	-	-
	362						-	1	3	1	-
	364						-	-	1	1	-
	367						-	-	1	-	-
	368						-	-	-	-	1
	369						-	1	1	-	-
Comal	400				-	-	-	-	-	4	1
	404				-	1	-	-	1	6	1
	405				-	2	-	1	6	5	3
	406				-	3	-	2	6	4	1

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TABLE 79 (continued)

Form-Class	Form	Form Subclass: Rim Curvature	Form Subclass: Neck Height	Form Subclass: Form Subclass	Form Subclass: Form Subclass	Form Subclass: Rim Elevation Angle	Phase H	Number per Phase: Tilancingo	Number per Phase: Temazcalli	Number per Phase: Early Cuauhnáhuac	Number per Phase: Late Cuauhnáhuac
(Comal)	410				1	1	-	-	-	1	-
	411				1	3	-	-	1	5	3
	414				1	2	-	-	-	5	-
	415				1	3	-	-	1	-	8
	416				2	1	-	-	1	1	-
	417				2	2	-	-	1	2	-
	421				3	4	-	-	2	-	-
	422				3	4	-	-	1	-	-
	423				3	4	-	-	-	1	-
	424				4	2	-	-	-	-	2
	428				5	3	-	-	2	1	-
	431				5	4	-	-	-	1	-
	432				5	4	-	1	-	-	-
	433				5	4	-	-	2	2	-
	434				5	4	-	-	1	-	-
	436				6	2	-	-	2	-	-
	437				6	2	-	-	1	-	-
	439				6	3	-	2	6	3	-
	440				6	3	-	-	1	1	-
	443				6	3	-	-	-	2	-
	445				6	2	-	-	1	1	-
	447				6	3	-	-	-	3	-
	448				6	3	-	1	1	1	-
Misc	520 (miniature bowl)						-	-	1	4	3
	601 (pitcher)						-	-	5	2	-
	603 (copa)						-	-	-	1	-

APPENDIX B

COUNTS PER LEVEL

Table 80 provides a list of counts per level of selected descriptive classes. Further documentation in terms of counts of various attributes and dimensions per level is not included in the present work. This information is contained in a number of computer files, and interested persons may contact the author about examining the data.

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TABLE 80

SELECTED DESCRIPTIVE CLASSES BY LEVEL (IN SERIATED ORDER)

		Plain Bowls		Decorated Ollas			Morelos Decorated Bowls							Western Imports				Eastern Imports			Basin of Mexico Imports				Other Imports	
	Unit	Black Slip Interior	Brown-Black	Red-on-Buff	Tlahuica Polychrome	Taxco Black-on-White	B-4 Polychrome	Teopanzolco Imp.	Eroded Tlahuica	Related Polychrome	Guinda	Guinda Copa/Pitcher	Red-on-Buff	Toluca Red-on-White	Toluca Black-on-White	Wavy Line Red-on-Cream	Malinalco Polychrome	Graphite Guinda	Morelos-Puebla Black-on-Orange	Chalco-Cholula Polychrome	Aztec I	Aztec III	Texcoco Fabric-Marked	Texcoco Molded/Filleted	Incised Redware	Fine Orange
Late Cuauhnáhuac	2		5				1				1												1	4		
	4	2	18				1	1			1		1	1										2		
	3	2	21		2		2			2	4		1						1					2	1	
	1		7				6																	3		
Early Cuauhnáhuac	5	1	8				8		2		3						1									
	18	6	6				4				14	c						1				11	1			
	6	6	13		1		11	2			9						3						1			
	15	5	22	1			8	4			3		1					1		2		1	2		1	
	7	4	17	1	2		5	8			21		1				1						2	6		
Temazcalli	10	1	9		5		6	4			12	3P		2												
	19	5	6	2			2	1	2		24	P											2			
	14	4		1			1	5			28			3		1			1		1					
	8	32			4		3	5	3		38	P	7	17		9		7	2				1			
	20	6		2		1		2			7			2		2							1			
	16	7	4		1		3				6		3	1		3		1	4	1			1		2	
Tilancingo	12										4		1	2		1							1			
	11	8		1							1		2	4		6		3					2			
	13	1									1			1		2										
	9	10		1							9		2	11	3	7			1				1			
H	17												4													1
TOTAL		100	136	9	15	1	61	32	7	2	186	5P 1C	23	44	3		5	13	9	3	1	12	16	17	4	1

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VITA

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